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FOURTEEN CASES

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OF

V A R I O T O M Y.

BY

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SURGEON TO THE EDINBURGH EAR DISPENSARY, ETC.

EDINBURGH: PRINTED BY OLIVER AND BOYD.

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FOURTEEN CASES OF OVARIOTOMY.

July 1863, I read before the Edinburgh Medico-Chirurgical Society an account of the first successful cases of ovariectomy performed in Scotland since Mr Lizars' single and partial success in 1825. The subjects of these operations have remained in perfect health. One married eight months after the operation, and the others have since performed the usual duties of home life; while one, twenty-seven years of age, in whom the weight of the tumour removed, a year and a half ago, was upwards of one hundred and twenty pounds—the largest tumour, by far, ever removed successfully from the living body—is now a strong healthy woman. It is proposed to continue an account of all the operations for ovarian disease which I have since then performed—successful as well as unsuccessful—in the order in which they occurred. I wish it to be understood that these are fair cases; I have not removed small tumours, and I have invariably declined operation when the general health was very good and the disease the cause merely of inconvenience, and not of danger to life. But I have not felt warranted in declining a single case—however large the tumour or however much reduced the strength of the patient—in which there was even a bare probability of success, although by operating on very large tumours, or in desperate cases, one, of necessity, risks both the credit of surgery and his own reputation. In one case which I saw last year, and again a few months ago, interference with the tumour was not recommended, on account of its extensive and intimate connections with the uterus, bladder, and rectum. I have lately declined other three cases in which I was asked to operate; but in all of them the disease had nearly reached its natural termination. Of these, one died within forty-eight hours, another within a week, and the third within three weeks after being first seen. It would have been simple foolhardiness to expect, that in such extreme cases nature would give one any assistance, in sustaining the shock, or repairing the injury necessarily inflicted by such a severe proceeding as ovariectomy must always be in large tumours. All of these cases, however, had been most favourable for removal only a few weeks or months before. With these exceptions, I have declined no case where the tumour was capable of being removed. It is only fair to add, that since

I commenced these operations, nearly two years ago, I have declined operating in nine cases, in which the general health was not interfered with, and life not yet threatened by the disease, on the ground that I was not justified in recommending, and the patient not warranted in undergoing, such a formidable operation. Of these, I regret to say, three at least have died. Two died in the country, after a first tapping to facilitate their journey to town. Another, who came to me first about eighteen months ago, I declined, though a most favourable case at that time for operation, on the ground that the tumour was merely an inconvenience to her. She was very anxious to have it removed, and I agreed to do so as soon as her general health became much affected. She left disappointed, went home, had the cyst injected with iodine, suffered a great deal of pain for several days after the injection; returned in a few months, larger than ever, with her general health much impaired, and asked me now to fulfil my promise, and remove the tumour. But I was obliged to decline a second time, on account of the adhesions that had formed in the pelvis after the injection of iodine into the cyst. These were of such firmness that the removal of the tumour would have been impossible.

The average weight of the tumours removed was a little over 42 lbs.; the average of the fatal cases upwards of 50 lbs., while that of the successful cases was 39 lbs., or, excluding the very large tumour, a little upwards of 31 lbs. Adhesions, generally extensive and often of great firmness, were met with in all the cases except four, and these four recovered without the slightest unfavourable symptom. And, though equally favourable recoveries occurred in some cases where adhesion was great, in not a few a successful result was got with great difficulty, and after a long and tedious convalescence, with more or less suppuration in the pelvis.

In the following case an attempt was made, towards the natural termination of the disease, to save the life of one of the most remarkable women I ever met. She had been repeatedly tapped, and I had in consequence to deal with unhealthy blood, and with a nervous system enfeebled by long and great suffering, and if the attempt was a failure, and her life was thereby shortened by a few months, the unfortunate termination seemed after all to have arisen from rupture of, and hæmorrhage from, the ovary that was left, and which at the time of the operation was apparently in a healthy state—one of those accidental and unforeseen circumstances that every now and then must arise after all capital operations.

CASE I.—*Multilocular Ovarian Tumour, weighing nearly 80 lbs.*
Ovariectomy. Death on the second day.

In the end of May last, Dr Thomson of Dalkeith asked me to see a married lady, twenty-three years of age, who had just come under his care. She had made a long railway journey the day before, and was in consequence much fatigued. She was so emaciated, and looked

exhausted, that the idea of interfering with the tumour in any way was ruled out of the question. The abdomen was occupied by an enormous multilocular tumour, and she measured upwards of fifty inches at the umbilicus.

The disease had been detected when she was seventeen years of age, a few months before her marriage. Its progress was slow, her health continued excellent, and after the first tapping no solid matter was felt, and she was soon able to be about again. The tapplings went on, however, the intervals steadily shortening by one-half, and now, after each time an increasing mass of solid matter was felt, and her size diminished less and less. Till the last tapping, three months ago, her general health had remained unaffected; but since then she had not rallied as she used to do, and had been quite an invalid. She suffered greatly from neuralgic face-ache and pain in the right side over the semi-solid part of the tumour. She had lost flesh very much, took little food, and lived mostly on stimulants.

She required tapping about a week after this. Upwards of 50 lbs. of thick fluid were removed. The tumour consisted of one enormous cyst, with a large semi-solid mass occupying the right side, extending under the ribs. The tumour was unattached in the pelvis, but the large cyst did not subside much. A few days after this tapping she was seized with phlegmasia dolens of the left leg. She suffered severely, but in three weeks she was able to be up again. She was put upon full non-stimulating nourishment, her general condition improved, and she gained flesh; while the tapping, which was looked for in six weeks, was delayed for upwards of three months. It became necessary, however, by the middle of August, and upwards of 50 lbs. of fluid were again removed. I was not aware at the time of the tapping that the period had not quite passed over, and she was scarcely laid on her back when she was seized with an intense pain in the right groin. She said she was sure something had given way. The pain was most acute, and for two or three days she was very ill, with all the symptoms of peritonitis. She had great abdominal tenderness, and a rapid pulse. In a week, however, she was again up, and then, for the first time, she spoke to me of the chances for and against her after ovariectomy. She knew she could not now have an average chance, but still there seemed a reasonable prospect of success.

The tumour was accordingly removed on the 27th of August. There was slight parietal adhesion in front, and the omentum was wound around and adherent to the semi-solid portion of the tumour over a great extent, but there was no difficulty in securing the vessels, and but little injury done in its separation. The mass of semi-solid matter was, however, very large. It extended under the ribs on the right side, over the upper part of the abdomen, and across to the left side. Several large cysts were tapped, and the mass reduced so that it was easily withdrawn. The mass of secon-

dary cysts and cyst walls weighed nearly 30 lbs., and upwards of 50 lbs. of fluid had been removed from the largest cyst, about ten days before. Before closing the wound the right ovary was drawn aside, and some of my friends present remarked what a healthy ovary it looked. Satisfied with its small size and natural appearance, I did not touch it.

She was put to bed in an excellent state. The night was passed quietly, and next morning she had an excellent expression, and quiet pulse. About eleven o'clock she suddenly vomited, and complained of the same intense acute pain that she had felt after the last tapping, and said surely something had given way. Her pulse began to rise after this; and she died thirty-eight hours after the operation.

The pelvis was nearly full of sero-sanguinolent fluid. On the posterior border of the right ovary were two ruptures—one of some standing the other quite recent. In the one was adhering a decolorized clot; and this rupture had probably taken place during the menstrual period, at the time of the last tapping, ten days before. In the other the fissure was recent, and a very large coagulum was adherent in it.

CASE II.—*Multilocular Ovarian Tumour weighing 40 lbs.*
Ovariectomy. Recovery.

An unmarried lady, twenty-three years of age, who had enjoyed an average amount of health, had her attention directed by her friends, about the middle of July last, to an increase of her size. She was seen early in August by Dr Drummond of Glasgow, who found the abdomen occupied by a large ovarian tumour. The formidable nature of the affection under which she laboured, and the only remedy for it were explained by him to her friends, but as her life was not then threatened by the disease, no immediate interference was recommended. She was advised to live quietly, and go for a time to the country.

A few days after this, when on her way through Edinburgh, she was seized with severe abdominal pain, and was unable to complete her journey. Her distress was farther aggravated by the jolting in a cab on her way to a friend's house, and when seen shortly after by Dr Warburton Begbie, she was suffering from severe peritonitis. The acute symptoms soon yielded to the remedies employed, but the tumour enlarged. She suffered so severely from the distention, she had such weary sleepless nights, and began to lose flesh so rapidly, that on the 21st it became necessary to relieve her by tapping, the girth at the time being nearly 45 inches. This I did at Dr Begbie's request. Nearly four gallons (40 lbs.) of thick green fluid were removed. The cyst walls were felt to be very thick, and were extensively adherent to the parietes, while a mass of secondary cysts filled up the left iliac region.

She was much relieved, and in the course of a fortnight was able to be removed to Ayr. Though she gained strength to a certain extent she was unable to walk, but was moved about in a chair. As the cyst commenced to refill, she increased at the rate of half an inch a-day, and in little more than a fortnight she was brought back to town nearly as large as before. On the 27th, tapping was again necessary; and 35 lbs. of very thick fluid were removed. She did not, however, diminish so much as after the former tapping, for the mass of secondary cysts had greatly increased.

It was now evident that the disease could no longer be safely temporized with, and that it would run its course with unusual rapidity. It became necessary for me to place before her in cold statistics, the risks and advantages of the radical cure. She had to make her choice between the certainty of a short life,—and it would have been a very short one, not free from suffering, and the chance of a long life after ovariectomy. The operation was at once decided upon, and performed on the 29th of September—two days after the second tapping. Dr Begbie, Dr Warburton Begbie, Dr Craig of Ratho, Dr Sidey, and Dr Keith, were present. There were extensive but recent parietal adhesions, which gave way readily to the hand. The pedicle was short and broad, extending about twelve or fourteen inches along the base of the tumour. The clamp was applied within an inch of the uterus, and there was consequently a good deal of strain upon the pelvic tissues; a troublesome oozing from some torn adhesions to the false ribs on the right side delayed the closing of the wound for nearly half an hour; otherwise nothing unusual occurred.

The cyst walls weighed 5 lbs. 6 oz., and 35 lbs. of fluid had been removed from the large cyst two days before.

No bad consequences followed; and since her return to Glasgow, a month after the operation, she has enjoyed excellent health.

CASE III.—*Large Semi-solid Ovarian Tumour. Ovariectomy. Recovery.*

In the end of August, Dr Wm. Brown asked me to see a young lady only sixteen years of age, in whom an attack of abdominal pain had led to the detection of an ovarian tumour, about seven months before. Its increase was rapid, and in July last it was punctured below the umbilicus, and after passing a sound through the canula, and breaking into several cysts, a considerable quantity of very thick viscid fluid was obtained, without, however, much diminishing the size or determining at any one point the subsidence of the tumour. When I saw her six weeks after, she was nearly as large as before.

This young lady's case is thus described by the author of the *Excursion Chirurgicale en Angleterre*, who was present at the tapping, "Ainsi, j'ai vu une jeune fille de 15 à 16 ans, dont je vous ai déjà parlé, atteinte d'un kyste multiloculaire énorme à contenu visqueux, filant, gris verdâtre, dont la ponction, après avoir vidé

diverses poches, ne parvint à déterminer le retrait sur aucun point, de l'épigastre au pubis et d'un flanc à l'autre. Évidemment il y aurait eu imprudence à tenter l'extirpation d'une telle tumeur dont les adhérences étaient si fortes et si étendues qu'elles auraient empêché probablement le chirurgien de terminer l'opération. Il est évident que, dans ces circonstances, l'opération est contra-indiquée, et que la maladie paraît inévitablement mortelle ; mais c'est un cas à rapporter aux contre-indications naturelles de l'ovariotomie."

The abdomen was entirely occupied by a large irregular semi-solid mass. There was only one cyst of any size, which occupied the epigastric space, extending under the sternum. The ribs were already being pushed outwards, and the ensiform cartilage pointed slightly upwards. In the left hypochondrium the tumour bulged outwards, and felt very hard and near the skin. She had long suffered from severe pain in this region, and here firm adhesion was evident. In the right iliac region the tumour felt also very hard and near the surface, and here, too, pain had been from time to time complained of. The pelvis was occupied by a solid mass coming below the brim, and the uterus, though it could not be moved from off the tumour, had a sort of rotation upon it, giving the impression that the pedicle was very short, rather than that adhesion existed between the two.

She was pale and thin, with a feeble circulation, but her general health was still good. She took her food well, slept well, and was able to take carriage exercise without fatigue.

After this she went to the country, and I saw her again on her return to town in the beginning of November. Her general health continued good, but the tumour had increased in all directions,—especially above. The cyst, filling the epigastric space, was larger and more tense and prominent. The ensiform cartilage now pointed directly upwards. The ribs were more bulged outwards, especially laterally, and the measurement over the lower end of the sternum was two inches greater than at the umbilicus. My attention was now directed to the state of the spine, for the whole of the lumbar and three lower dorsal vertebræ were very prominent, rendering the curvature of the back so great, that with the bulged condition of the ribs she was quite barrel-shaped.

In hopes of getting some information as to the connexions of the upper part of the tumour, I tapped the upper cyst at its lower margin, on the 12th November, midway between the umbilicus and ensiform cartilage. A large trocar was used, but after a few ounces of very glutinous fluid escaped, the stream stopped and no more could be obtained, though on passing in a probe it was evident the cyst was of considerable size. Soon after, pain came on, and in the course of an hour I found her with a pale anxious countenance, thoracic breathing, and a very rapid pulse, suffering from intense pain and tenderness, with vomiting, all over the upper portion of the abdomen. Large opiates and fomentations relieved this, but for some days her condition gave rise to not a little anxiety. All

At this time there was a constant oozing, from the puncture, of the same gelatinous sticky fluid, and it was supposed that altogether more than a gallon made its escape. For two or three days there was no clear sound on percussion, as low as two inches below the ensiform cartilage, but by the end of a week this had quite disappeared, and the dulness extended as high as before. It was afterwards found that the upper cyst had not in the least refilled, but that its position had been occupied by the semi-solid portion moulding itself into its place.

After repeated examinations of the tumour, it seemed to me that there was no obstacle to its removal, as far at least as its upper portion was concerned. But the nature of its connection with the uterus could not be quite satisfactorily determined, while the now very great curvature of the spine—rendering it uncertain whether this arose from disease of the bodies of the vertebræ themselves, or whether it was simply caused by the direct weight and pressure of the now almost solid tumour—added greatly to the anxious doubts and grave responsibilities of the case. But on the other hand, the patient was but sixteen years of age, of a healthy family, with young and probably not yet unhealthy blood, and her nervous system as yet not much broken down by suffering or sleepless nights. I, accordingly, felt warranted in recommending to the patient and her friends, that an attempt should be made to remove the tumour, else there was nothing to be looked forward to but a short and miserable life. And as the recent inflammatory attack would, in all probability, lead to the formation of extensive adhesion along the upper part of the tumour, it was evident that this attempt should not be delayed very long. She had lost flesh since the tapping, and had not been out of bed. She was not in a very good state for the operation, for the tongue was big and foul, but there was very little chance of her ever again getting into a better.

The tumour was accordingly removed on the 21st of November. Dr Brown was present. Dr Keith gave chloroform, and Dr Keiller and Dr James Sidey gave me their usual invaluable assistance. The tumour was exposed over a mass of thickened and contracted cysts, the result apparently of the first tapping. The opening was enlarged sufficiently to admit the hand, which was pushed through loose adhesion downwards, and the pelvic cavity examined as far as it was possible to do so. It was apparently free of adhesion, but the uterus could not be reached. Below the umbilicus the adhesions were very loose, and gave way at once to the pressure of the hand. Above they were much as was anticipated, being nearly universal. These were all gradually separated by the hand; but, on the left side, they were of the utmost firmness, and in breaking them down the tumour fissured and gave way in all directions. I was, however, totally unprepared for the great mass of solid substance that extended under the ribs, for three-fourths of the whole tumour lay above the umbilicus, and though I had enlarged the incision up to the ensiform cartilage, I am sure I could not have removed the

tumour entire. A very large trocar was then pushed here and there into it, but only a small quantity of very viscid thick matter could be obtained. I next cut deep into the heart of the mass below the umbilicus, cut with the knife and opened cysts in all directions, and, passing in my hand, broke down the inside of the tumour. This was not easily accomplished, for the divisions between the cysts—and they were all small—were very fibrous and thick, and gave way to the fingers very unwillingly. Half a pailful of fluid and broken down cysts was thus obtained, but the vascularity of the interior was so great, that it was necessary to finish this part of the operation with the utmost rapidity and with apparent roughness. I succeeded at length in dragging through an opening, extending only an inch above the umbilicus, a mass of solid matter and cyst-walls, weighing upwards of 20 lbs. As this was withdrawn a firm and thick band of adhesion arising from the right iliac region came into view. It formed almost a second pedicle, and contained large vessels. It was transfixed and tied. The pedicle itself now came into view on the left side, but the uterus came out with it. The upper part of the pedicle which ran along the tumour up to near the false ribs was of great length, but it gradually shortened and disappeared in the corner of the uterus which was quite close to the tumour. It was tied in four or five divisions, for the clamp could not be got under the tumour and the mass cut away. The clamp was then applied round the long part of the pedicle, and an attempt made to tie the vessels singly in the portion which was connected so closely with the uterus; but after tying two large vessels, there was so much oozing that I reluctantly embraced the whole in the clamp, bringing the uterus in consequence against the abdominal wall. When the bleeding from the torn adhesions had ceased, the clots were removed and the pelvis sponged out, and the omentum, which was of very great size, was carefully spread by the fingers over the intestines, and especially over the left side where the adhesions had been strongest, and where the tendency to ooze was greatest. The wound was then closed by thirteen deep stitches, placed closely together on account of the thinness of the abdominal wall. But the elevation of the ribs was so great that the cavity of the abdomen remained half-filled with air. The ribs were pushed downwards and the air pressed out as much as possible alongside the clamp,—a large heavy compress of wet lint being placed over the wound and a bandage over the ribs to keep them down and prevent the re-entrance of air.

She was under chloroform for an hour and a half. The whole proceeding had been one of the utmost severity; and when the pallid, fragile, emaciated form was lifted into a warm bed, and left to nature and an intelligent nurse, it seemed to us all that nature had been asked to do too much to repair the injury that had of necessity been inflicted.

But on the sixth day after the operation she felt so well that she thought she might be allowed to do a little work. That night she had a slight chill, which, however, seemed to have passed off by

next day after free perspiration, without doing any harm. The seventh night was restless, and in the morning for the first time the pulse was rising. There was some abdominal tenderness, which was not relieved by having the bowels moved by enema. By mid-day the distention was considerable, and as there was some pull upon the clamp, it was removed. This was followed by relief of the pain, and to a considerable extent of the distention also. The pulse continued to rise, and towards afternoon vomiting came on, and though the sutures had been removed some days before, no harm was done to the freshly united wound by the first attacks of vomiting. Some strips of plaster were, however, put on, not that they were absolutely necessary, but to give confidence during the vomiting. The attacks of vomiting went on every half-hour, and were very severe, the pulse having now risen to 150, and her condition for some hours was most critical. The state of the pedicle was examined after every attack. It had considerably retracted, and there had been some oozing from it, and during every fit of retching there was a gush of yellow serum from the abdominal cavity. About midnight a large vessel was observed bleeding from the stump of the pedicle; this was at once secured, and the whole freely touched with the perchloride of iron. Towards morning copious serous discharges came from the bowels, and the vomiting then ceased. In a few days there was decided fulness of the recto-vaginal fossa, but as there was now a good deal of discharge from the lower end of the incision—at first of a serous oily nature, then dirty serous, and then purulent—it was not interfered with, but its degree of tenseness carefully watched from day to day. By the end of the third week the discharge from the wound was copious, and continued more or less for several weeks. During all this time the pulse continued high; but her recovery—thanks to the most careful and intelligent of nursing—was now uninterrupted, and six weeks after the operation she was thoroughly convalescent. She was round-shouldered for some time, and had a considerable stoop, but this soon wore off when she began to get out, and the spine quickly regained its normal curvature; and in a short time it was impossible to recognise, in the healthy-looking blooming girl, the subject of all the anxious doubts of a few months before.

CASE IV.—*Multilocular Ovarian Tumour, weighing 26 pounds.*
Ovariectomy. Recovery.

On the 18th of October last, Dr M'Watt of Dunse asked me to see Mrs J., aged fifty, who had sought his advice four months before on account of ovarian disease. She was then scarcely able to retain any food, and had had several attacks of vomiting of blood. Under treatment the vomiting ceased, and her general health became much improved till five weeks before I saw her, when she was obliged to take to bed on account of severe abdominal pain which had continued more or less ever since.

She was a very little woman, pale, extremely emaciated, and

very feeble. The pulse was small, and generally about 90. She had restless nights from dyspnœa, and could scarcely take any food. She measured $41\frac{1}{2}$ inches at the umbilicus. The upper part of the tumour was fluid, but from the extremely œdematous condition of the abdominal wall it was impossible to make out the state of the lower portion. The uterus was central, normal, and movable, but the roof of the vagina came very low down, especially on the left side. The general condition of the patient was so unfavourable that the idea of operation could not then be entertained; but in hopes of giving her some temporary relief, about two gallons of fluid were removed from the upper cyst by puncturing it above the umbilicus. A large semi-solid mass was now felt to occupy the lower and left side of the abdomen below the umbilicus. After some days, when the œdema of the wall had somewhat subsided, Dr M'Watt was able to make a more careful examination, and was satisfied that the adhesions were both firm and extensive.

Much to our surprise she rallied, and had so far regained strength as to be removed to town in the beginning of January. The tumour had nearly regained its former dimensions, and the œdematous anterior wall hung down over the pubis, forming a tumour nearly the size of the head.

She got cold on her way into town, and had an attack of influenza, which was prevalent at the time. To relieve the bronchial irritation and dyspnœa, she was again tapped, and the œdema of the limbs and abdominal wall having somewhat subsided, the tumour was removed on the 16th of January. Dr M'Watt of Dunse, Professor Stewart of Kingston, Dr Sidey, and Dr Keith were present. The external incision was extended to two inches above the umbilicus. The omentum was lying between the tumour and wall, adherent to both. As the parietal adhesion was very firm, I cut through the omentum till the surface of the tumour was reached; and finding the adhesion of the omentum less firm to the tumour than to the wall, I separated it from the tumour to the left side till the free edge was reached. It was then freed and turned to the right side, but all its parietal attachments were not separated. Very firm parietal adhesion existed between the semi-solid part of the tumour occupying the left side and iliac region. Posteriorly the tumour was embedded in a mass of small intestine and mesentery. These adhesions were easily separable, except a piece of mesentery, about the size of the palm of the hand, which was very firmly attached, and contained large vessels. Lower down its connections were separated along the brim of the pelvis on the left side, and a semi-solid mass was adherent along the side of the rectum and hollow of the sacrum. This last adhesion was firm, and part of the serous covering of the tumour was torn off and remained. Finally, the mass was turned out after much injury had been inflicted on the peritoneum. The pedicle was short, and when the calliper clamp was secured outside, from the thickened state of the abdominal wall there was a great pull upon the uterus. Part

the omentum, which was still adherent to the pedicle and side of the uterus, was separated, and some vessels secured; still there was a good deal of oozing coming up apparently from the torn pelvic adhesions. This was found at last to come from a fissure in the pedicle immediately below the clamp. The clamp was accordingly removed and readjusted, and the bleeding point secured. The wound was then tightly closed by a number of deep stitches in anticipation that the œdematous state of the wall would subside in a few hours.

There was a good deal of shock. She passed a restless night, and next morning there was so much distention from flatulence that the head of the clamp was buried in the wound, and the handles standing up at nearly a right angle. These unpleasant symptoms disappeared shortly after giving her some simple food. By the end of the third day the stitches were lying loose and were removed, as was also the clamp, the wound being quite united throughout. On the ninth day she was removed during the day to the nurse's bed, and was walking through the room by the end of the second week. She returned to Dunse, a distance of fifty miles, in the midst of a snow-storm on the twenty-fifth day after the operation. Since then she has enjoyed the best of health.

CASE V.—*Multilocular Ovarian Tumour, weighing 37 lbs.*
Ovariectomy. Death, on the sixth day, from Peritonitis.

M. B., aged forty, a tall, thin, sallow-looking woman, unmarried, was sent to me last autumn by Dr Wilson. She had an ovarian tumour of five months' growth, which already nearly reached the ensiform cartilage, but as it had not yet given her much inconvenience beyond what arose from its bulk, I recommended her to let it alone. Her girth then was 37 inches.

She returned in four months. She was now 42 inches at the umbilicus; the tumour had nearly doubled in size, and she had lost much flesh. She was now unable to do anything for herself, was beginning to have restless nights, and suffered from pain in the epigastrium, while the lower extremities were distended almost to bursting. There was also great œdema of the loins and abdominal wall, as high as the umbilicus; there was no albuminuria.

She had lived a very sedentary life, and some years before had been confined to bed for nearly twelve months with subacute rheumatism, which had left her hands slightly deformed. She was, moreover, the only surviving member of her family, all of whom had died early, mostly of phthisis. Her general condition was thus not a very favourable one for ovariectomy; still the case seemed a fair average one.

She was tapped in the end of January. Twenty-three lbs. of thick fluid were removed from a large cyst which composed the lower half of the tumour. The upper portion of the tumour did not in the least subside, and a large semi-solid part continued to

occupy the upper half of the abdomen. The œdema of the limbs soon subsided, but the cyst began at once to refill.

The tumour was removed on the 7th of February through an opening just sufficient to admit the hand. The lower cyst was first tapped, and the upper cysts were emptied through the larger one. There was parietal adhesion, easily separated by the hand, from a little above the umbilicus upwards over the epigastrium. As the mass of cyst-walls, weighing upwards of 6 lbs., was being withdrawn through rather a small opening, one of the cysts gave way, but none of the contents seemed to get into the abdominal cavity. There was no bleeding, no exposure of the intestines, and the operation was completed in a few minutes. There was a slight pull upon the uterus when the clamp was secured outside, but not nearly so much as I had often met with before. The wound was closed by deep and superficial silk sutures as usual.

She vomited very severely as she came out of the chloroform, and complained all afternoon of intense sickness, with burning at the epigastrium. By evening she was suffering severely from flatulence, which continued all night, preventing sleep. This continued to a most distressing degree, with a constant overpowering feeling of sickness. By the end of the second day, there was some distention of the upper part of the bowel, which went on increasing. The pulse also began to rise. The clamp was removed on the third day, and a good deal of yellow serum followed its removal, without, however, affording relief. I could not satisfy myself that there was any accumulation in the pelvis from the examination of the recto-vaginal fossa. She died on the morning of the sixth day.

The small intestines were found all glued together by recent lymph, pretty well organized; and in the pelvis, which was completely shut off from the rest of the abdominal cavity, there was about half a pint of dirty thin peasoup-looking fluid, with flakes of lymph, showing the low form of abdominal inflammation. The wound was quite healed, and the peritoneal line of incision could scarcely be distinguished. I had allowed the silk sutures to remain in all the time the patient lived. She died on the morning of the sixth day, and there was no matter lying along their tracks. It would appear, therefore, that in this case at least, the silk suture answered all the purposes that the admirers of the wire suture claim for it.

CASE VI.—*Unilocular Ovarian Tumour. Ovariectomy. Recovery.*

In April last, Professor Christison asked me to see a married lady about fifty years of age, who had laboured under ovarian disease for upwards of twenty years. The tumour had been of very slow growth, and had scarcely affected her general health till about the time I saw her. The abdomen was occupied by a large single cyst, and the contained fluid felt so thin and so near the surface that but for the history, it would have been impossible to tell

Whether it was ascitic or ovarian. There was slight œdema of the legs, and she was thin; otherwise her health was good.

Three months afterwards the tumour had considerably increased, there was also greater œdema of the extremities, she was unable to get up at night, and the heart was beginning to beat above its normal level. It was accordingly agreed to remove the cyst; but, before doing so, I emptied it, and as the fluid was clear, of low specific gravity, and as there was no solid mass whatever to be felt, only a thin-walled cyst,—it seemed more prudent to delay for a while any farther interference.

She suffered severely for several days after the tapping from abdominal pain, vomiting, and vesical irritation. She was, however, able to be about again in ten days, and for nearly eight months she enjoyed excellent health, and no trace of the cyst could be detected. About the end of February, however, it suddenly began to fill with great rapidity, she quickly lost flesh, and it was agreed to remove the tumour as soon as the œdema of the lower extremities should commence.

This was accordingly done on the 25th of March. Professor Syme, Dr Dewar of Kirkcaldy, Dr Sidey, and Dr Keith were present. An incision about three inches in length was made, commencing midway between the umbilicus and pubis; the peritoneum was opened to half this extent, and a large non-adherent cyst tapped and drawn out. The cyst arose close from the uterus, the clamp was placed round its lower portion, and from the absence of pedicle and great depth of the pelvis, there was a considerable drag upon the uterus, which was brought up close to the wound. In consequence of this there was a good deal of dragging pain in the back complained of for the first forty-eight hours, to relieve which small opiate enemata were given by the nurse when the pain got troublesome; otherwise no unpleasant symptom appeared, and she did not suffer nearly as much as she had done after the tapping. She was in the dining-room to breakfast by the end of the third week, and returned to the country twenty-five days after the operation.

This lady is the wife of one of the best known and most successful Scotch provincial surgeons,—a man of unusual sagacity, but unfortunately long laid aside from active life by great suffering; and his experience of ovarian tumours during a long and active practice of nearly forty years did not encourage him to recommend any other mode of treatment than the radical cure. And while he observed the slow but steady progress of the disease, and looked forward to the time when it would necessarily interfere with the life of his wife, he keenly watched the history and progress of ovariectomy in Great Britain, and so far back as ten years ago, having thought the matter out for himself, he ventured to assure her, that by the time her tumour should require interference, the operation of ovariectomy would be as common as and more successful in its results than, amputation of the leg. Till 1858, however, the success of the operation in England had not been very encouraging, and in Scotland and Ireland the results had

been invariably unsuccessful. Its progress at that time seemed stationary, or rather it seemed to retrograde; for the surgical heads of the profession would not give it a fair trial, while the majority denied it a place in legitimate surgery. But, in 1858, the operation was taken up in earnest by Mr Wells. In his hands it was much simplified, and he introduced common sense into its after-treatment. It became at once evident that a period of progress had begun, and it may be imagined how eagerly were watched the brilliant results that year after year have followed the operation in Mr Wells' hands; for there can, it seems to me, be no doubt that to Mr Wells belongs the credit of reviving this operation in England, and of establishing it as one of the most justifiable and often most welcomed operations in surgery.

The above case, though the simplest I had yet operated on, and the only one in which I had not met with extensive adhesion, is, however, a very important one, as showing the confidence with which the operation of ovariectomy is being received by the profession. In this family there were no fewer than four intelligent medical practitioners, who, when the question of ovariectomy was brought near them in the person of a near relative, thought the whole matter out for themselves, and recommended the operation; and they were too good surgeons not to recognise the good surgical principle, that the less broken-down the general health of the patient the greater would be the probability of success.

CASE VII.—*Cystic and Adenoid Ovarian Tumour. Ovariectomy. Recovery.*

In March last, Dr Drummond of Glasgow asked me to see a lady who had come under his care two months before, on account of ovarian disease. She had enjoyed good health till the autumn of 1861, when she suffered from attacks of diarrhoea. During 1862, she had violent and repeated attacks, and was then put upon a diet consisting chiefly of beef juice, and upon this she has since continued principally to live. In January 1863, the lower extremities began to swell, and for the first time she felt her dresses tight upon her. She again had diarrhoea in the autumn of that year, and in September had an attack of menorrhagia, which continued ten days, with some violence, but which did not recur. In November she was seized with sudden acute pain in the left iliac region, recurring from time to time, and of great severity. When Dr Drummond saw her, two months ago, he found a tumour in the left and lower part of the abdomen, pushing down into the pelvis, and there was distinct ascitic effusion. She was very much emaciated and feeble, with œdema of the lower limbs, and altogether she looked very ill. The question at that time with Dr Drummond was, whether it was a case of malignant disease or of multilocular ovarian tumour complicated with ascites.

She was placed on a full diet, with a liberal allowance of wine, and sent for change of air to the country. She returned to Dr

summond in six weeks, with her general health greatly improved, but with the abdominal swelling immensely increased, and its ovarian nature now undoubted.

I found a vigorous old lady, just entering on her sixty-eighth year, nearly blind, moreover, from double cataract. She was very illow, and extremely thin, with a dry, red, irritable tongue, but with a heart beating so quietly and firmly, that one's first impression was, that with fair play such a constitution was good for many years to come. She complained mostly of flatulence, from which she had suffered all her life, and attributed to it attacks of dyspnœa, which came on generally towards morning, and which were sometimes prolonged and severe. She still had diarrhœa from time to time.

There was œdema of the lower extremities, and to a slight extent also of the abdominal wall. The tumour was very prominent, and extended up to the ribs on either side, the upper part of the abdomen being very much distended from flatulence. Immediately above the pubis was a projecting solid elastic mass, about the size of a child's head—the rest of the tumour was cystic, but its upper margin was very ill defined, and it had a peculiar boggy feeling—leaving upon me the impression that some soft substance, such as the omentum or a mass of intestine, lay between the tumour and abdominal wall. In the pelvis it was entirely solid, an elastic piece of it, coming very low down, filled up the recto-vaginal fossa. In front of the uterus, which was barely movable, it felt very hard and solid, and was continuous with the mass above the pubis. At first view this state of matters looked suspicious either of malignant disease or of great pelvic adhesion. But after repeated examination I was satisfied that the base of the tumour was free from attachment either to the rectum, uterus, or bladder. The tumour certainly had a peculiarly elastic feeling which I had not met with before, but it was just as likely to be adenoid as malignant, and this it turned out to be.

About a week after I first saw her, she had a severe peritonitic attack, occasioned by being jolted in a cab. This was followed by a large accumulation of ascitic fluid, which disappeared in a few days, almost as suddenly as it came, after some diarrhœa. Its presence, however, completely cleared up the diagnosis of the pelvic portion of the tumour, but the upper part still retained the same ill-defined character that it had always presented; and at the umbilicus there was generally a small extent of clear sound over the tumour, as if at that point there was adhesion of the intestine. She remained under observation for a month, the tumour steadily increasing in all directions. She had occasional feverish attacks, with abdominal tenderness, followed by ascitic accumulation, which came and went very rapidly. She was fast losing flesh and strength; the dry red tongue still continued; the disturbance from flatulence became more distressing, and the attacks of dyspnœa more frequent and severe. It was after seeing her in one of these attacks, which

more resembled a paroxysm of angina, that I resolved to remove the tumour, for it was evident that her life was not now safe from one day to another. Considering the great age of the patient, her great feebleness, her blindness, and the doubt as to the relations of the upper part of the tumour, this determination was arrived at with not a little difficulty.

On the 21st April, I opened the abdomen very carefully, immediately below the umbilicus. The wall was very thin, and a few touches of the knife exposed the surface of an ovarian cyst. This was emptied through a small canula, and another upper cyst then came into view. This was quite flaccid and half-empty, with part of the small intestine and mesentery adhering to it, and fully explained the feeling communicated to the hand by external examination. The omentum was very large, but was nowhere adherent. The intestine was then carefully separated, but its muscular coat was slightly exposed. Several small vessels in it and its mesentery were tied with silk—the ends cut short and left behind. The solid mass was then turned out of the pelvis without difficulty. The uterus came out with it, but there was plenty of room to secure the pedicle outside in the usual way. The whole weighed about fourteen pounds.

For several days after the operation there was very great distention of the abdomen, and there was a fear for a time that some low abdominal inflammation was going on, there being for some days considerable fulness of the recto-vaginal fossa. On the fifth day there was some swelling of the parotid, which gave rise to great pain and constitutional disturbance, and went on to suppuration. After this, her recovery was unimpeded, and she returned to Ayrshire six weeks after the removal of the tumour. The tongue by that time had become pale and moist. She had no more attacks of diarrhœa, and felt better than she had done for years. The last time I heard of her, she said she was “as good as new.”

CASE VIII.—*Semi-solid Ovarian Tumour, weighing 24 lbs.*
Ovariectomy. Death on the ninth day.

J. M., aged 21, a domestic servant, called on me in March last, on account of a semi-solid ovarian tumour, extending nearly to the ensiform cartilage—her girth at the umbilicus being forty inches. She stated that nine months ago she came up from Golspie, a strong healthy woman; that for the last six months, since she became aware of the presence of the tumour, she had felt feeble, and unable to do almost any work; that she rarely passed a day without sickness and pain; that her nights were restless and wearisome; and that for the last week she had been mostly in bed. She was much depressed in spirits, and very anxious to have the tumour removed.

A few days after this visit, she was obliged to take to bed, with severe abdominal pain, and almost incessant vomiting. This state of irritation continued, with short intervals of relief, for the next

month. She was never able to be out of bed, and when she sat up she had a peculiar tendency to faintness, which was remarkable and unusual. In the middle of April she was removed to a suitable lodging, where for a short time her general health improved. The vomiting ceased, she enjoyed her food, and slept well. She was seen in a fair state for operation, and it would have been performed on the 21st had not the monthly period come on with great violence, accompanied by such severe gastric irritation, vomiting, and pain, and such prostration of strength, that for some days she was in a most critical state, and it seemed as if she would never again get into a condition for operation. She rallied, however, and the tumour was removed on the 29th of April. Dr Benjamin Bell, Dr Traill of Dunfermline, Dr Carruthers of Cramond, and other friends were present. There was no parietal adhesion, but part of the omentum was firmly attached to the upper portion of the tumour,—several vessels were tied with silk, and the ends of the ligatures cut off short and left. A piece of omentum, from which there was a good deal of oozing, was transfixed and tied, the threads being likewise cut short and returned. The pedicle was of good length, and was secured by the clamp without any strain upon the uterus. Some ascitic fluid in the pelvis was then sponged out, and she was put to bed in a very good state.

For the two days following the operation she remained in a very feeble and depressed condition, the pulse ranging from 120 to 150. There was, however, no pain, no vomiting, and no distention. On the third day the pulse had fallen to 100; and by the end of the first week her recovery was looked upon as undoubted. The abdomen had remained quite flat; the wound was perfectly united; the stitches were all removed; the bowels had acted after the fourth day of themselves; she had fair nights; and took her food remarkably well, and was cheerful at the prospect of her early return to health and independence. But on seeing her on the morning of the ninth day, I was startled by her appearance, which reminded me of a case of typhus. She had had a restless night; the pulse was up to 115; there was slight subsultus, and she was covered with a bright papular eruption. On calling in the evening, I found she had died rather suddenly about half an hour before. There was no post-mortem examination, but that blood-poisoning was the cause of death I have no doubt.

CASE IX.—*Unilocular Ovarian Tumour. Ovariectomy. Recovery.*

M. C., 35 years of age, had been under the observation of Professor Buchanan of Glasgow since the tumour was first detected about three years ago. Latterly its growth has been very rapid; and as soon as she began to lose flesh, and her general health to be threatened by the disease, he recommended the removal of the tumour.

This I did at Glasgow, on the 6th of May, at Professor Buchanan's request. Dr Drummond of Glasgow, Dr George

Buchanan, and other friends were present. The cyst was easily removed through an incision three inches in length, and a long slender pedicle secured by the clamp; the whole proceeding being of the simplest kind possible.

I saw her a week afterwards, and removed the clamp, and she made an excellent recovery.

CASE X.—*Semi-solid Ovarian Tumour, weighing 35 lbs.*
Ovariectomy. Recovery.

In April last an unmarried lady, forty-seven years of age, the daughter of a medical man, was recommended to me by Dr Cumming, and Dr Grigor of Nairn, as a fit subject for ovariectomy. The tumour had been detected about six months before, and had been of very rapid growth. All along there had been a great deal of pain; while for the last three months the general uneasiness had been so extreme, that she had been unable to sit or lie in any position, by day or by night, for any length of time. Before the commencement of her illness she had been very plethoric, but she was now losing flesh very rapidly.

Three weeks before I saw her, she had been tapped by Dr Grigor below the umbilicus, and about fourteen pints of fluid removed. She had little relief, however, from this, for the upper part of the tumour did not subside, and it had again nearly regained its former dimensions. The largest cyst that could now be detected was above the umbilicus, and the cyst formerly emptied did not appear to have refilled. The greatest girth was forty-three inches.

On meeting, on the 10th of May, with Dr Arthur Mitchell and Dr Cumming, for the purpose of removing the tumour, her general condition was so unfavourable, that it was agreed to postpone the operation, and simply to tap the upper cyst, in hopes of giving some relief. This cyst was found to contain about fourteen pounds of fluid, and she felt so much more comfortable after the tapping, and had such good nights, that we felt warranted in going on with the operation, on the 20th of May, ten days after the tapping. The tumour was semi-solid, and there were extensive but easily broken down adhesions in all directions. These were separated, as far as the hand could reach. The tumour was then cut into and broken up. When its size was much reduced, the hand was again passed in, and some adhesion to the small intestine and extensive adhesion to the stomach separated; and I was then able to withdraw the whole without extending the incision above the umbilicus. The pedicle was of fair length, and was secured as usual by the clamp, and the wound closed by silver sutures.

It would occupy too much space to go into the details of the tedious convalescence which followed,—the longest by far I have yet met with after ovariectomy. Violent peritonitis, nearly proving fatal, set in on the third day. This was followed towards the end of the first week, by effusion into the left pleura; and to this again succeeded a second attack of general peritonitis of great severity.

the wound, which seemed at first to have united, towards the end of the second week, took on unhealthy action, and opened up through its whole extent. Great sloughing of the cellular tissue of the abdominal wall followed, and the tracks of the wire sutures became converted into so many different sinuses, which went on discharging for weeks, the wound itself slowly healing by granulation. She had also bed sores, and lay for many weeks in a state of great debility on a water bed; and it was not till two months after the operation that she was able to make the long railway journey to Cairn. She is now quite well, and becoming a strong woman again.

CASE XI.—*Multilocular Ovarian Tumour weighing upwards of 65 lbs. Ovariectomy. Death from Exhaustion.*

Mrs W., æt. 29, but looking twenty years older, came to me with a very large ovarian tumour. She had been seen, for the first time, the day before, by Dr Lungair of Largo, who, though recognising the advanced stage at which the disease had arrived, still thought the case might be one for ovariectomy, as the patient had, till the detection of the disease eighteen months before, been remarkably healthy, and she was of a vigorous and healthy family.

She had already been tapped three times, and had taken a great deal of medicine of various kinds. Till two months before I saw her she had not suffered much from her complaint, and had not lost much flesh, and was generally able to look after her household affairs. She then underwent a prolonged mercurial course, which she said completely took the flesh off her bones. Since then she has been very feeble.

She was exceedingly emaciated, and presented in a well-marked degree the weary, miserable, haggard appearance of advanced ovarian disease. The tumour was very large, measuring upwards of forty-nine inches a little above the umbilicus. Between the anterior spine of the right ilium and the umbilicus the measurement was seventeen inches; between the spine of the left ilium and the umbilicus she measured twenty-one inches; and the space between the ensiform cartilage and pubis was thirty inches. The abdominal wall was, over a large extent, thickened, brawny, and œdematous. The tumour was mostly composed of one very large cyst, but there was a considerable amount of solid matter on the left side low down. The uterus was central, normal, and very movable.

She was a woman of great resolution, and though she was well aware that her case was an unfavourable one, she wished to take her chance of the operation, in the hopes of being restored to her husband and children.

She was tapped the day after I saw her, and upwards of sixty pints of very thick ovarian fluid were removed. She was much relieved. She was put upon a full diet, and slept better than she had done for months. The usual monthly period, after being

delayed for a week, continued for ten days. Nearly three precious weeks were thus lost, the cyst was filling with great rapidity, and her strength had greatly diminished.

The tumour was removed on the 23d of May. Professor Syme, Professor Lister, Dr Lungair of Largo, and other friends were present. The girth had already increased to forty-three inches. The cyst was wounded in opening the peritoneum, and the contents were allowed to escape. There were extensive parietal and omental adhesions, and more bleeding than usual from the torn vessels, as I have always observed is the case when the abdominal wall is much thickened. Several vessels in the omentum and wall were tied with fine silk, the ends cut off and returned. A long thin pedicle was secured by the clamp as usual. Owing to a free oozing from the torn adhesions, the operation was prolonged, and there was much more sponging and handling of the parts than usual.

She had a quiet night, and required but one small opiate enema. The urine was copious, and perspiration moderate; and she took from time to time some beef-tea and other simple nourishment, with an occasional small quantity of stimulant. She complained all along of feeling very tired, and though she promised well next forenoon, her pulse, though not frequent, was very feeble; and she died in forty-six hours, as one dies from the shock of a great injury.

CASE XII.—*Ovarian Tumour nearly Unilocular. Ovariectomy.
Recovery.*

An unmarried lady, now twenty-seven years of age, was seen in November 1861, by Mr Wells, who diagnosed an ovarian cyst, unattached anteriorly, with a secondary cyst or cysts in the wall a little below the umbilicus. Her health was then good, and he recommended her to wait. Some time after this, on her return home, she was for many weeks confined to bed from supposed cyst inflammation, and her general health was for long very indifferent. I first saw her towards the end of last year. She was then in good health, but thin, and measured forty-one inches at the umbilicus. The cyst was still apparently unattached, and the secondary cyst felt by Mr Wells three years before had not increased, though its position was now more upwards—sometimes to the left of the umbilicus, and sometimes near the edges of the false ribs. Delay was still recommended.

I saw her again with Dr Dunsmure in May last. The tumour was steadily increasing. She was losing flesh and was getting anxious to be relieved of her burden, and we agreed to remove it, believing that it was safer to do so than to tap so large a cyst.

This was done on the 30th of May. Dr Dunsmure and Dr Gordon of Old Aberdeen were present. The large cyst, containing forty pints of fluid, was emptied, and together with a single secondary cyst, was easily withdrawn through an opening in the peritoneum about two inches in length. As I was about to apply the clamp, a small cyst in the broad ligament was observed. This

l to a more careful examination of the attachment of the cyst, and fewer than seven small cysts, about the size of beans, were discovered, some of them near the uterus. The ovary itself, diseased and slightly enlarged, was close to the uterus, and quite sessile. A double ligature was placed under it, but it could not be got into the clamp, which was applied almost close to the uterus. From the thickness of parts embraced in the clamp, a single stitch sufficed to close the wound. Before tightening the stitch, the strangulated ovary was brought out alongside the clamp and secured to it. Owing to the great laxity of the abdominal wall, there was not much strain upon the pelvic tissues, though the uterus was brought up close to the wound.

On the second day the monthly period came on with great violence, and there was for two days a copious discharge of menstrual-like fluid from the incision. The clamp was removed at the end of a week, but the ligatures round the strangulated ovary did not separate for five weeks after the operation. Her recovery was uninterrupted.

CASE XIII.—*Semi-solid Ovarian Tumour weighing Thirty-six Pounds. Ovariectomy. Recovery.*

Miss W., aged thirty, recommended to me by Dr Haldane of Ayr, on account of a large semi-solid ovarian tumour of about six months' growth. When I saw her in the beginning of June, her greatest girth was thirty-eight inches; there was one cyst of considerable size above the umbilicus, the rest of the tumour was semi-solid. She was in pretty good health, but was getting very thin about the arms and shoulders. She could walk but a very short distance, and her nights were bad.

By the 1st of July her girth had increased to forty-two inches and a half, and there was some œdema of the limbs. To relieve this and to give her some good nights before the operation, I emptied the upper cyst, which contained about eight pounds of fluid. I removed the tumour on the 8th of July. Dr M'Lannaghan of Dalrymple was present. Some ovarian fluid, mixed with large flakes of lymph, escaped on opening the peritoneum. I then cut into the tumour, passed in my hand and broke it up, and with some difficulty was able to withdraw the whole through an incision not extending above the umbilicus. There was a great deal of sponging necessary. The pedicle was of fair length, and was secured by a clamp, and the wound was closed by six deep and three superficial silk sutures in the usual way.

She got very sick with the chloroform, and vomited bile for the next twenty-four hours, but her pulse never rose above 70, and her recovery was unusually rapid. The sutures were removed on the fourth day, except one close to the clamp which had escaped notice, which was removed on the eighth day. There was not a single drop of matter along the track of any. By the middle of the

third week she was going about quite well, and she went to her home, near Ayr, four weeks after the operation.

CASE XIV.—*Large Cyst containing Fifty-five Pounds of Fluid.*
Ovariectomy. Recovery.

Miss B., aged thirty-five, a patient of Dr Halliday Douglas, had been aware of the existence of an ovarian tumour for about twelve years. I saw her first six years ago. At that time it filled up the whole abdomen; was unilocular, and unattached. It steadily increased, and now she measures forty-four inches at the umbilicus, twenty-nine between the ensiform cartilage and pubis, and twenty-eight inches between the one anterior spine of the ilium and the other. There is great elevation of the ribs, and great displacement of the heart, for its impulse is felt below the third rib two inches from the mesial line. She has latterly become very nervous and thin, and has bad nights.

On the 25th of July, I opened the peritoneum to the extent of two inches and a half, tapped, and drew out the cyst, which contained between five and six gallons of fluid. The cyst was almost sessile, and the clamp was placed round its base, the uterus being brought up nearly to the abdominal wall. One deep silk suture was sufficient to close the wound.

For several days after the operation she suffered from severe cardiac pain, apparently of a neuralgic nature, with a frequent tendency to syncope. There were no abdominal symptoms whatever, and her recovery was rapid and uninterrupted.

The following table contains an account of all the operations for ovarian tumour, which I have up to this time performed. Of twenty cases in all, six patients died after the operation, and fourteen recovered perfectly, and are now in rude health, for the cure after ovariectomy is a perfect cure.

Table of Twenty Cases of Ovariectomy.

No.	Date.	Age.	Condition.	History, etc.	Result.
1	1862. Sept.	49	Married,	Multilocular; 25 lb.; surrounded by ascitic fluid;	Remains well.
2	1863. Jan.	55	Married,	Multilocular; 45 lb.;	Remains well.
3	Feb.	24	Married,	Multilocular; 63 lb.; tapped once;	Died 23 hours after.
4	March.	27	Married,	Multilocular; upw. of 120 lb.; tapped 4 times;	Remains well.
5	May.	22	Unmarried,	Multilocular; 33 lb.; since married;	Remains well.
6	July.	52	Married,	Fibro-sarcomatous, and cystic;	Died 5th day.
7	Aug.	23	Married,	Multilocular; nearly 80 lb.; tapped 7 times;	Died 38 hours after.
8	Sept.	23	Unmarried,	Multilocular; 40 lb.; tapped twice;	Remains well.
9	Oct. 1864.	16	Unmarried,	Semi-solid; very large; tapped once;	Remains well.
10	Jan.	55	Married,	Semi-solid; 23 lb.; tapped twice;	Remains well.
11	Feb.	40	Unmarried,	Multilocular; 37 lb.; tapped once;	Died 6th day.
12	March.	50	Married,	Large single cyst;	Remains well.
13	April.	68	Married,	Cystic and adenoid;	Remains well.
14	May.	23	Unmarried,	Semi-solid; 24 lb.;	Died 9th day.
15	May.	35	Unmarried,	Large single cyst;	Remains well.
16	May.	29	Married,	Multilocular; 65 lb.; tapped 4 times;	Died 46 hours after.
17	May.	47	Unmarried,	Semi-solid; 35 lb.; tapped twice;	Remains well.
18	May.	27	Unmarried,	Multilocular; 35 lb.;	Remains well.
19	July.	30	Unmarried,	Semi-solid; 36 lb.;	Remains well.
20	July.	33	Unmarried,	Very large single cyst, containing 55 lb. of fluid;	Remains well.

With the Author's Compliments

FURTHER OBSERVATIONS

15

ON

THE WAXY OR AMYLOID FORM

OF

BRIGHT'S DISEASE.

BY

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MDCCLXIV.

RESEARCHES ON THE
NATURE OF THE
DISEASES OF THE
LIVER AND SPLEEN
BY
J. C. GIBSON, M.D.
OF EDINBURGH.

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FURTHER OBSERVATIONS

ON THE

WAXY OR AMYLOID FORM OF BRIGHT'S DISEASE.

IN February 1861, I published in this Journal certain views as to the symptoms which accompany the waxy or amyloid degeneration of the kidney, one of the forms of Bright's disease: symptoms which I conceived to be so distinct and constant as to render it easy for us to distinguish during life between this and other forms of renal affection. In this paper I propose to indicate the results of my observation of that disease since the period of my former communication, and the conclusions at which I have arrived. Nearly all the cases have been observed in the Royal Infirmary, and I beg to acknowledge my obligation to the physicians who have kindly permitted me to publish them.

The description which I then gave was the following:—"An individual who has long suffered from wasting disease, such as scrofula, caries, necrosis, or syphilis, or who, though without palpable disease, is of a feeble constitution, feels an increasing weakness, and begins to pass large quantities of urine, and to drink largely. He is, contrary to his usual custom, obliged to rise repeatedly during the night to make water, and on each occasion passes a considerable quantity. The amount of urine varies from 50 to upwards of 200 oz. daily, always bearing a relation to the amount of fluid drunk, generally nearly equalling it in amount, or sometimes even exceeding it. The feet and ankles become œdematous after a hard day's work, but return to their natural condition during the night's repose. In many cases there is observed a hardness and swelling in the hepatic and splenic regions, dependent on an increase of bulk of the liver and spleen. The patient feels a constant lassitude and unfitness for exertion. His urine gradually becomes albuminous, and a few waxy or hyaline tubecasts are to be found in the very scanty sediment which it throws down. It is of low specific gravity—1005 to 1015. The blood presents some peculiarities microscopically: the white corpuscles being somewhat increased in number, and the red presenting a flabby appearance, with a marked tendency to tail,—that is to say, instead of forming into

rouleaux, like healthy corpuscles, they become stretched out into long, spindle-shaped bodies. The blood changes I have observed only when the degeneration affected the lymphatic or blood glands. The patient may continue in this state for months, or even years—may, indeed, undergo a temporary improvement—the liver and spleen becoming diminished in bulk, and the blood resuming a more healthy character; but, sooner or later, for the most part ascites or general dropsy gradually supervene, accompanied frequently by diarrhoea, which is at times found quite uncontrollable. The urine, now very albuminous, diminishes in quantity, so as at times to be almost or altogether suppressed; effusions into the serous cavities or severe bronchitis ensues; the patient becomes exhausted and sinks, or drowsiness comes on, and the disease terminates amid coma and convulsions.”

Further experience has confirmed the opinions then expressed, and in all cases in which an autopsy revealed the lesion, and in which I had the opportunity of carefully examining the patients, I ascertained the existence of the symptoms which I have indicated. In support of my views I adduced in my former communication twenty cases, in nine of which the existence of the lesion was ascertained by post-mortem inspection. In the present paper I shall complete the history of three of these, continue that of another to the present time, and give a summary of fourteen other cases, in several of which autopsies have been made.

CASE I.—A. M., shoemaker, æt. 33. His case was minutely described in the previous paper. Of a syphilitic constitution, he was, about four years ago, under treatment in the Infirmary for enlargement of the liver and spleen, with slight leucocythemia. He had no dropsy, but made a large quantity of water, of low specific gravity. From his history and the urinary symptoms, I ventured to anticipate the appearance of albumen in the urine. It was carefully tested, day by day, and, after a while, a trace of albumen appeared; this gradually increased; and afterwards fine hyaline tubecasts were occasionally seen in the urine. These symptoms had lasted for about nine months at the date of my former publication, and since that time they have steadily continued. The following notes were taken at the dates mentioned:—

4th February 1861.—The liver and spleen have further diminished in size. His appearance is somewhat less cachectic. For some days he has had a pain in the neighbourhood of the umbilicus, and along the margin of the liver, aggravated on movement or on pressure, and after eating. The stools are of a dark colour, and contain some bright red blood. He has no piles. The amount of urine continues high, about 120 oz. daily. It is albuminous.

8th October 1861.—The patient again presented himself; his cachectic appearance is increased; he complains of a severe pain in the lumbar region, and along the spermatic cords. His renal symptoms continue unchanged, and the liver is still distinctly enlarged.

Since that time he has frequently presented himself at the New Town Dispensary and elsewhere; has repeatedly been an inmate of the Royal Infirmary; has been able occasionally to work at his occupation of shoemaking, and has of late acted pretty constantly as cook to the Mid-Lothian Militia stationed at Dalkeith. The last note I have taken of his case was on 21st March 1864. He continues to make large quantities of water daily, usually upwards of 120 oz. It is still albuminous, but no tubecasts have been discovered for some time. The hepatic dulness is diminished to about six inches; the organ is still painful on pressure.

He has no nausea, and his bowels are regular; but on several occasions lately he has had intense diarrhoea, sometimes bloody, and has vomited blood-coloured matters. His complexion is even darker than before, and his eyelids are more œdematous than I have ever observed them. From some observations made for me by Mr Taylor, it appears that his temperature is somewhat lower than natural.

CASE II.—E. H., a washerwoman, æt. 43. This case was reported in the previous paper. She had been of intemperate habits, but was not known to have had syphilis; she had long-continued polyuria; her urine was of low specific gravity, very albuminous, and contained hyaline casts. She had also a lesion of the aortic and mitral valves. She was dismissed from the Royal Infirmary in May 1860. In November of that year I found that her symptoms were not materially changed. She continued to make from 180 to 210 oz. of urine daily. It was of low specific gravity; it contained albumen and casts. There was slight œdema; the diarrhoea less intense than formerly; the cardiac symptoms unchanged. Throughout the years 1861-62-63 I saw her frequently in St Cuthbert's Poorhouse, in the Royal Infirmary, in the dispensary, and elsewhere. Her renal symptoms were little altered. A distinct aneurismal dilatation had gradually developed itself; and a certain amount of œdema of the limbs occasionally appeared. When she was last in the Infirmary I had the opportunity, by the kindness of Dr Laycock, of making the following notes:—

20th April 1864.—The skin is pale; conjunctiva clear, slightly œdematous. There is a good deal of congestion over the malar bones. The legs are œdematous; the tongue is clean. She has some difficulty in swallowing, particularly solids. Sickness follows eating, and she occasionally vomits. Vertical hepatic dulness in the right mamillary line measures about five inches. The bowels are loose. She complains of pain in the left hypochondrium. She has occasional giddiness, and sleeps badly. Her pupils are equal. There is a double blowing murmur at the apex of the heart, and at the base of the neck there is a very distinct aneurism. The urine is copious, exceeding on an average 100 oz. daily. Its specific gravity is about 1008. It is of an acid reaction, contains much albumen, some phosphates, and epithelium and granular casts.

5th June.—Her dyspnœa, dropsy, and general debility gradually increased, until the 5th of June 1864, when she died.

Autopsy, 58 hours after death.—The body was well nourished. The right pleural cavity contained about half an ounce of clear serum. The left pleura was obliterated by old adhesions. Both lungs were congested and œdematous; in several parts there were small dense nodules, whose nature was not determined. The pericardium contained a little fluid, and some lymph was deposited on both its layers. The heart was enlarged, weighed $8\frac{3}{4}$ ounces; it was fatty. The margins of the mitral valve were thickened. The aortic valves incompetent. The aorta was dilated, its coats sclerotic and atheromatous, and contained some calcareous plates. There were distinct dilatations in the course of the innominate and subclavian arteries. The liver weighed 3 lbs. $3\frac{1}{2}$ ounces, was soft and fatty, and presented no reaction with iodine. Spleen weighed $3\frac{3}{4}$ ounces, and was not waxy. The right kidney was small, weighing 4 ounces; the capsule was adherent; the surface granular; the cortical substance was atrophied. The left weighed 6 ounces, was distinctly waxy and fatty, less atrophied; the capsule was also adherent. The Malpighian bodies, as well as the arteries of the cortex and of the cones, were in a state of waxy degeneration.

CASE III.—E. B., a bricklayer's labourer, aged 33. His case was recorded in the previous paper. Of a syphilitic constitution, he made a large quantity of water, upwards of one hundred ounces daily, highly albuminous, of low specific gravity, and containing a few waxy casts. He was dismissed from the Infirmary on the 30th of April 1860. The following notes indicate his after history:—

7th April 1861.—His general appearance is better than it had been last year. He states that he is quite well, but that the daily amount of urine has not diminished. It is highly albuminous, of low specific gravity, and contains casts.

His tongue is clean; his appetite good; his bowels are moved twice a-day. The liver is much enlarged, measures eight inches vertically, and extends considerably across the epigastrium to the left side. The spleen is also enlarged. The blood contains an excess of white corpuscles. Expiration is harsh and prolonged at the apices of both lungs. The heart-sounds are altered in tone, but not of a blowing character.

13th August 1862.—The patient again presented himself. He is more emaciated. States that from increasing debility he has been unable to work for a month past. He still makes large quantities of urine, which is albuminous, but not so intensely as before. It deposits a sediment containing hyaline tubercasts, with oil-granules here and there arranged in groups, as if resulting from disintegration of cells. There has been no dropsy of late. The liver, though still enlarged, is decidedly diminished since last report. He complains much of his breathing.

22d September 1863.—He complains much of difficulty of breathing, and of cough and headache when he attempts to stoop; he has also dropsy; and from all these symptoms feels himself unable to follow his usual work. The amount of urine is still large. He is obliged to rise three or four times every night in order to micturate. The urine is albuminous, and contains casts. He entered the Infirmary, and under the care of Dr Sanders improved, so as to be able to go out, and for a time pursue his usual avocations; but in November he again presented himself, complaining of a further aggravation of his symptoms. He died soon after admission, in November 1863, and his body presented the following post-mortem appearances:—

The body was somewhat emaciated. The heart was enlarged; its left side was much hypertrophied. The aortic valves were competent; but at the base of one of the segments there was a calcareous mass. The aorta was very atheromatous. The lungs were very cedematous; the bronchi were congested and full of mucus. The liver was about the natural size. On its surface were a number of nodules and cicatrices. At the bottom of some of the latter, nodules of a pale colour were visible. On section, numerous nodules were found scattered throughout the organ; they were pale, dense, and had an appearance exactly resembling bees-wax; their structure was much denser than that of the surrounding tissue. In some nodules there were streaks of fibrous tissue throughout the substance and round the margin, and the greater the proportion of that tissue the deeper were the cicatrices. In the nodules elevated above the surface there were no such streaks, or very few. In those situated at the bottom of deep cicatrices, the fibrous element was abundant, or even in excess of the glandular. On applying iodine to these masses, the whole of the waxy-looking material assumed the brownish red colour characteristic of the amyloid degeneration, but the fibrous streaks simply assumed a yellow tinge. Microscopically, the masses were found to present exactly the characters of ordinary amyloid hepatic cells. They were composed entirely of these cells, enlarged, transparent, and finely granular. In some parts the cellular elements were broken down, and a finely granular material containing some oil-globules was present. The fibrous tissue in the masses presented the ordinary characters of connective-tissue; and where it was most abundant the cells were most atrophied. Throughout the rest of the organ the cells were little affected with the waxy degeneration, but some of the small vessels showed it distinctly. The fibrous bands were seen passing into the tissues round the cicatrices and nodules. The capsule of Glisson was thickened in some parts, and on applying the iodine externally to the cicatrices no reaction was observed. The spleen contained one cicatrized mass, which presented no reaction with iodine. The kidneys were somewhat contracted in the cortical substance, and presented a very well-marked instance of the amyloid degeneration of the vessels and Malpighian bodies. There was some degree of amyloid degeneration of the villi of the small intestine; the bowels were otherwise natural. The prepuce presented traces of the old syphilis, and it had been previously ascertained that there were numerous syphilitic ulcerations in the throat.

CASE IV.—J. M., brushmaker, aged 33. His case was recorded in the previous paper. Of a syphilitic constitution, he exhibited distinct traces of the cachexia. While under observation, he passed from 60 to 80 ounces of urine daily, of low specific gravity, albuminous, with hyaline tubecasts, and containing here and there a fatty cell. He was dismissed from the Infirmary about the middle of August 1860, and for a year afterwards I saw him occasionally. He always retained the cachectic appearance, and continued to make large quantities of urine. Until the end of October 1861 he was going about attending to his work, but suddenly his urine diminished in quantity, and became bloody, and on the following day he was seized with convulsions. These continued for some days. He was removed to the Infirmary, where he died on 5th November. In the intervals of his fits he was conscious, though unable to speak.

On post-mortem examination there were found syphilitic necrosis of the cranial bones, and other evidences of constitutional syphilis. The liver was large and distinctly waxy; the spleen presented the degeneration in a slight degree; the kidneys were somewhat contracted, firm, and presented an exquisite specimen of the amyloid degeneration of the vessels and Malpighian bodies.

In these four cases we have a continuation of the history of this disease in cases previously published. The following cases are new.

CASE V.—J. M., labourer, aged 18, admitted to the Royal Infirmary, under the care of Dr Bennett, 13th September 1861. He stated that six weeks previous to admission he caught cold, had cough, with frothy expectoration, and soon afterwards that he noticed that he was passing more water than usual. Had frequently to get up during the night to empty his bladder. About a month later his feet began to swell.

On admission, the heart-sounds were normal. There were the ordinary signs and symptoms of bronchitis. There was no dropsy. The skin was cool and moist. There was lumbar pain. The urine was pale, very copious; of specific gravity 1012; highly albuminous; contained granular and fatty tubecasts. He had great thirst. The bowels were constipated.

The amount of urine varied between 3d and 15th October from 75 to 122 ounces. Only on three days was it below 100 ounces. Throughout that month the quantity continued large, though on some days it was considerably diminished, and it was almost invariably in excess of the fluids drunk. The pulmonary symptoms rapidly increased in severity. The upper half of one lung became distinctly dull, while the bronchial affection increased. There was some degree of dropsy. The blood contained fully double the natural proportions of white corpuscles.

During November and December the daily quantity of urine gradually diminished. The albumen did not diminish. The casts became less fatty. General dropsy set in. This symptom became so distressing, that, on 10th June, acupuncture was employed for the relief of the dropsy. At the same time the pulmonary symptoms steadily increased, and the patient died on 13th January.

On post-mortem examination, there was general dropsy of cellular tissue and serous cavities. The heart was somewhat hypertrophied. Both pleuræ were adherent. The lungs were œdematous, and contained distinct traces of tubercle. The kidney capsule was adherent; the surface granular. The cortical substance somewhat atrophied. Many of the tubules were filled with finely granular fatty matter. The spleen was firm; the intestines were œdematous. On adding a solution of iodine, many of the arteries and Malpighian bodies assumed a reddish orange colour, and on the further addition of dilute sulphuric acid became reddish purple. There was slight waxy degeneration of the liver, spleen, and of portions of the intestines.

CASE VI.—I. C., æt. 16, a servant, admitted to Ward XI., 27th February 1861, under the care of Dr Laycock. She had in the year 1860 been affected with phthisis pulmonalis, and had somewhat improved. After I had lost sight of her she observed that she had occasion to get up several times every night to make water, and that each time she made a large quantity. About January she was exposed to cold and wet, and noticed that her feet and ankles swelled,

and her urine became diminished in quantity. She had also some lumbar pain and diarrhœa, and on this account entered the Infirmary.

On her admission I had an opportunity of examining her, and found the signs of phthisis considerably developed. She looked anæmic. Her appetite was bad. She frequently vomited. Her bowels were very loose. The amount of her urine could not be determined on account of the diarrhœa. It was highly albuminous; specific gravity 1030. Contained hyaline casts. The liver and spleen were enlarged. The blood contained an unusual number of white corpuscles. There was considerable general dropsy, and she died a few days after admission.

Autopsy.—The lungs were found to contain large quantities of tubercle, and on the intestines there were numerous irregular tubercular ulcers. The liver, kidneys, and spleen were found to be large and waxy. The Malpighian bodies and small arteries of the kidneys assumed a reddish purple colour on the addition of iodine and sulphuric acid. Many of the hepatic cells and the Malpighian bodies of the spleen presented the same reaction.

CASE VII.—J. C., æt. 21, a miner, was admitted, under the care of Dr Haldane, into the Royal Infirmary, in January 1864. He was of stunted growth. He had worked underground since he was seven years of age. At the age of sixteen he had pneumonia, and ever afterwards was breathless and liable to colds. He used to notice that he had to rise during the night to make water, and was often interrupted at his work from the same cause. Two months before admission he was exposed to cold and wet, and became dropsical. His urine diminished in quantity; its specific gravity was 1015, albuminous, and contained some casts. He died exhausted, partly by the renal and partly by pulmonary affection.

Autopsy, forty-two hours after death. The body was greatly emaciated. The lungs contained tubercle and carbonaceous matter. There were some vomicæ towards the apices. The heart was dilated. The liver normal. The spleen presented amyloid degeneration of the Malpighian bodies. The kidneys were of good size; many of the tubercles filled with fatty granules and exudation. The small arteries and Malpighian bodies presented a translucent appearance, and assumed a blue colour on the addition of iodine and sulphuric acid. The villi of the small intestine also presented this degeneration.

CASE VIII.—J. N., æt. 32, Ward VII., under the care of Dr Haldane, in the Royal Infirmary. Examined 25th January 1864.

Fourteen years ago, when the patient was eighteen years of age, he had chancre, and other signs of constitutional syphilis. These syphilitic symptoms continued to recur at intervals for a long time. Six years ago, having been exposed to cold and wet, he had what seems from his description to have been an attack of acute renal dropsy. From this he recovered. Has since had pains in the tibia, worst at night; in the epigastrium, and in the region of the kidneys. Towards the end of last year he observed that he was obliged to get up several times every night and make water, and that on each occasion he made a considerable quantity. He estimated the amount to be about 160 ounces. This has continued to the present time.

On admission, his liver was found enlarged. In the line of the nipple it measured 7 inches vertically; in the middle line $5\frac{3}{4}$. The spleen was also enlarged; measured $4\frac{1}{2}$ inches vertically, and 6 inches across. The blood contained an excess of white corpuscles, and the red did not form rouleaux, but irregular clumps; they had a tendency to tail. The tongue was loaded in the centre, furred at the edges. The appetite was good, but some sickness and vomiting followed every meal. The bowels were natural. The heart sounds were normal. Pulse about 92 per minute. There was some crepitation heard at the bases of both lungs, and at the apex of the right. There was pain on pressure over the kidneys. The urine varied in amount, from 90 to 130 or 150 oz.; was pale, of low specific gravity, contained much albumen, but no tubecasts could be found. There was also enlargement of the right testicle, and dropsy of the left tunica vaginalis. There were numerous

small periosteal swellings over both tibiæ. There was also a tendency to swelling of the feet in the evening, but not to any great extent. There were also occasional attacks of epistaxis, and of hæmorrhage from the bowels, and a purpuric condition of the skin of the lower extremities. The gums were also swollen and spongy.

12th April.—Under a general tonic treatment, the patient has in so far improved, but he continues to present the symptoms characteristic of waxy degeneration of the kidneys, liver, and spleen. He was dismissed relieved.

CASE IX.—A. M., a seaman, æt. 34, admitted to Paton's ward, under the care of Dr Laycock, 6th February 1864. In his profession of seaman he has travelled much in foreign countries. Was never an intemperate man, though he sometimes took a week's debauch on getting ashore. He never had syphilis, but once, several years ago, had some ulcers in the throat. Four years ago, while in India, he was ill of inflammation of the liver, at least an inflammation at the hepatic region, unaccompanied by jaundice. Since that time he has been working on the Burntisland ferry steamer, and was much exposed to cold and wet. He noticed that his feet tended to swell slightly, particularly towards evening, and about nine months ago (last August) he observed that he was compelled to leave his bed several times every night in order to micturate, and that each time he made a considerable quantity. This was before the dropsy began. Last October he caught cold, had cough and expectoration, and about Christmas his feet and legs swelled considerably, and he noticed that his abdomen was remarkably prominent and hard. These symptoms increasing, he was unable to work, and was admitted to the Infirmary 6th February.

On admission, he was a stout-built man, somewhat pale, but with numerous distended capillaries over the malar bones. He had an incipient arcus senilis. His breath was short; but the respiratory and circulatory sounds were normal. The gastro-intestinal system was normal; but the liver was much enlarged, measuring about eight inches vertically, and extending over on the epigastrium. The spleen also seemed enlarged. The blood contained a slight excess of white corpuscles, and the red had a somewhat flabby appearance. There was some degree of ascites. There was no lumbar pain even on pressure. The daily quantity of urine was about 120 ounces. Its specific gravity was about 1013; its colour pale amber; its reaction acid; it contained a good deal of albumen, and a few finely granular and hyaline tubecasts.

12th April.—Since he has been under treatment, his general health has improved. The dropsy has for the most part disappeared, but the characters of the urine have remained unaltered. He was dismissed relieved.

CASE X.—E. D., æt. 35, a bookbinder, first examined 7th March 1861. This patient had contracted syphilis fifteen years before he came under my observation. Since that time he has suffered from various constitutional symptoms, eruptions, nodes, tic, etc. At the time he was under my care he had a pustular syphilitic eruption on his face. During the year preceding he had observed that he was obliged to get out of bed several times each night in order to make water, and that he made a considerable quantity on each occasion. At the same time he observed that his feet were swollen at night, but the swelling had subsided in the morning. The urine varied in amount from 55 to 150 oz. per diem. It was highly albuminous, and contained a few hyaline casts. This large quantity of urine continued to be passed daily for several months during which he was under observation. The liver and spleen were natural.

The patient having left Edinburgh, I lost sight of him; but the symptoms of his case were so distinctly those of amyloid degeneration, that I have no hesitation in including him in this category.

CASE XI.—J. M., æt. 36, a labourer, was admitted to the Royal Infirmary, under the care of Dr Haldane, in April 1864. He had led an irregular life, had been a soldier, and was believed by his friends to have been the subject of syphilis. About two years before admission he was observed to make large quantities of water, and at a time at which he exhibited no other symptoms of

illness, his frequent micturition had become a standing joke in his family circle. About six months before admission he became dropsical, and excessively intemperate. About the middle of April he was exposed to cold and wet, and was seized with rigors, following upon which was a severe pneumonia, from which he died.

Autopsy.—His body was examined eighteen hours after death. The heart was normal. The right lung was pneumonic throughout, some portions of it in a state of grey hepatization, others less advanced. The left lung was adherent to the diaphragm at the base, and in its lower lobe contained a cicatrix. The liver weighed 5 lbs. 10 ounces, was waxy and fatty. Spleen waxy, weighed upwards of 1 lb. The kidneys were both enlarged, the right weighed 11 ounces, and the left 9 ounces. Both of them presented exquisite examples of the amyloid degeneration of the vessels and Malpighian tufts. There was also marked fatty degeneration of the epithelium in the tubules, and while the whole organs were increased in size, the cortical substance was relatively diminished. The surface was granular. There was abundance of fat throughout the body, particularly in the omentum and mesentery. The intestines tore off from the mesentery with the greatest ease. Its vessels were found to be in a state of amyloid degeneration. The villi and minute arteries of the small intestine presented exquisite examples of the degeneration. Brain congested. Serous effusion on its surface and under its membrane.

CASE XII.—M. R., æt. 44, was admitted to the Royal Infirmary, under the care of Dr Sanders, 26th May 1864. She was a field-worker, and latterly a washerwoman; had generally been healthy, but for two months before admission had been out of health; her breathing being embarrassed, her appetite poor, bowels loose, urine copious. A fortnight before admission dropsy had appeared. The quantity of urine was upwards of 80 ounces daily; it was pale, of specific gravity 1011; contained albumen, and no tubecasts. In the hospital these symptoms continued, and she died exhausted on 10th June.

Autopsy, seventy-two hours after death. The body was well nourished. The heart was natural. Aortic valves somewhat thickened. Arch of the aorta was very atheromatous, and contained some calcareous plates. The lungs were œdematous. Near the root of the left there were some tubercle-like deposits. Bronchial glands were enlarged, one of them suppurating. The liver was somewhat waxy; presented some syphilitic cicatrices. The spleen was intensely waxy, and throughout its substance there were a number of small abscesses. The pus which they contained was normal, and presented no reaction with iodine. The abscesses were scattered throughout the substance. The capsule was thickened, but not of dense structure; it was adherent to neighbouring parts. The kidneys were atrophied, and intensely waxy, some of the tubes as well as all the arteries and Malpighian tufts presenting the ordinary reaction with iodine. Connected with the uterus was a number of fibrous tumours. The ovaries were fibrous. The intestinal canal was also in a state of waxy or amyloid degeneration; its villi and small vessels presenting the reaction very distinctly.

CASE XIII.—A. L., æt. 26, admitted 16th May 1864, to the Royal Infirmary, under the care of Professor Bennett. The patient was a sempstress, unmarried. She stated that she had been quite healthy until two years ago (May 1862), when she had acute rheumatism, and since then had never been well. Her feet and legs, and afterwards her abdomen, swelled, and she was obliged frequently to get up during the night to make water. On admission, the heart and lungs were normal, face swollen, skin pale. The urine was large in quantity, varying from 70 to 100 ounces daily, of low specific gravity, and of pale colour; it contained abundance of albumen, and some tubecasts. She also had severe diarrhœa, and occasional sickness and vomiting. The dropsy gradually increased, and she died exhausted on the 29th of June.

Autopsy.—The face and upper parts of the body were very œdematous. The abdomen was somewhat distended with fluid, and the legs pitted slightly on pressure. The heart was natural. The left pleural sac was obliterated by old adhesions, and in the right there was considerable effusion. The lungs

were congested and œdematous. The liver was connected with neighbouring parts by a number of old adhesions, and on its surface there were several cicatrices. The whole organ was fatty and waxy; the vessels exhibiting a distinct reaction with iodine. The cicatrices were composed of fibrous tissue, with numerous vessels in a state of waxy or amyloid degeneration. The spleen weighed 8 ounces. Some of its vessels and Malpighian bodies were waxy. The kidneys weighed $5\frac{1}{2}$ ounces each, were fatty and waxy, granular on the surface; the cortical substance partially atrophied. Many of the tubules were filled with granular exudation, and the vessels and Malpighian bodies presented the appearance of the waxy degeneration and a marked reaction with iodine. Some of the smaller vessels were also fatty. The intestines were waxy throughout their whole extent, and presented no trace of ulceration. In the large intestine rings of pigmentary deposit surrounded many of the solitary follicles.

CASE XIV.—A. C., æt. 30, was admitted 30th May 1864, to the Royal Infirmary, under the care of Dr Sanders. The patient stated that she enjoyed good health till within four weeks of her admission, but for some months before had observed that she passed a larger quantity of urine than natural. She was obliged to get up several times during the night in order to micturate. She had a little dropsy, but it disappeared on the occurrence of diarrhœa a few weeks before admission. Her urine was pale, of specific gravity 1010, contained much albumen; was always upwards of 60 ounces daily, although she was affected at the same time with severe diarrhœa. She had frequent vomiting, and gradually became exhausted and died on 28th June. There was a distinct history of scrofula in her family. There was no positive evidence of syphilis, but she had the cachectic appearance, and complained much of pains in her bones.

Autopsy.—The body was somewhat emaciated. The heart and lungs were natural. Bronchi contained much muco-purulent fluid. The liver was large, weighed 4 lbs. 6 ounces; was bound to the diaphragm by numerous old adhesions. It was fatty and waxy throughout; both the vessels and cells were waxy. The spleen weighed 1 lb. 1 ounce; was intensely waxy. It was adherent to the diaphragm and neighbouring parts. The kidneys were both enlarged, the left weighing $9\frac{1}{2}$ ounces, the right $7\frac{1}{2}$ ounces. Both were intensely waxy. The vessels both in the cortical and conical substance, and the basement membranes of the tubes, presenting the amyloid reaction. In the right there were some tubercular-like masses, with corresponding cicatrices on the surface. The intestines were in a state of waxy degeneration. There was a small supernumerary spleen, which was also intensely waxy.

CASE XV.—A. F., æt. 22, a hawker, residing in Fountainbridge. She came under my care in March 1862, complaining of cough and œdema of her feet. I found that for three years she had had a cough, accompanied with expectoration and shortness of breath. Her chest gave signs of phthisis pulmonalis, but of a very chronic character. There was comparative dulness at the right apex; the respiration was indistinct, and accompanied by fine crepitation in the same region. The respiration at the left apex was clear, but the cardiac sounds were very distinctly propagated. The liver was enlarged, and extended across the epigastrium. Its vertical dulness in the mamillary line measured 5 inches. The spleen was not enlarged. The quantity of water was much above the normal, ranging from 80 to 130 oz. per diem. It was of a pale amber colour, slightly albuminous. No casts were found. The skin was dry; the appetite very fitful.

Since 1862 the patient has been under observation, and has sometimes improved in strength under tonic treatment, and at times suffered accessions of her disease. She has continued to pass large quantities of urine, which has at times been albuminous, at others not. She has also had hæmoptysis, and her chest symptoms are increasing in severity.

When she was lately an inmate of the Royal Infirmary, the following was her condition:—Skin pale; respiration harsh; slight dulness under right

clavicle; appetite irregular; urine about 105 oz. daily, of a pale yellow colour, specific gravity ranging from 1005 to 1012, of acid reaction, contained much albumen, much epithelium, and no sugar; no tubecasts were found. In this condition she continued when last seen.

CASE XVI.—Mr —, a gentleman of independent fortune, had, at about the age of 14, an abscess in the right side, near the hepatic region, but the source of which was not ascertained. He after this was healthy, vigorous, a keen sportsman; but at the age of 31 he began to complain of griping pains and severe diarrhoea. On examination it was found he was passing large quantities of urine. He was frequently obliged to get up during the night, in order to micturate. The urine was quite clear, very pale, of specific gravity 1008, containing albumen in considerable quantity. The casts were few, hyaline, with occasional fatty cells. The appetite was capricious; the stools were pale, and of an offensive odour. The liver was not enlarged. His symptoms gradually increased, and he died about the age of 32.

No autopsy was permitted; but his symptoms were so distinct as to incline me decidedly to reckon this a case of waxy degeneration of the kidney and intestine.

The following case illustrates the apparent curability of this degeneration. The patient exhibited all the symptoms of the degeneration of the organ, but these symptoms gradually disappeared:—

CASE XVII. Mr M., a gentleman, *æt.* 21, resident in Edinburgh, has been under my care for some months.

Some years ago he fell into a state of delicate health. His appetite became poor, and he became subject to occasional hæmorrhages, from the nose and other sources. His liver was greatly enlarged, extending downwards to the umbilicus; the quantity of urine increased to a marked extent, and was albuminous; his bowels were very irregular; and his general health much impaired. Under a course of iron, and of iodide of potassium, his general health improved, the liver diminished in size, and the urine became free of albumen. For about a year past no albumen has been observed; and his strength has become such as to enable him to resume his ordinary employment, and to work at it regularly during the past winter. The liver continues, even now, somewhat enlarged, and the cachectic appearance continues, but the urinary symptoms have very markedly improved.

The following case is of interest, as one possibly of amyloid degeneration of the kidneys, though the disease is not in the meantime distinctly defined:—

CASE XVIII.—W. L., a brassfounder, *æt.* 53, was admitted to the Royal Infirmary in March 1864, under the care of Dr Haldane. He states that he never had any venereal disease, excepting an attack of gonorrhoea, thirty years ago. He has been tolerably steady, but, while working in London, was accustomed to consume a good deal of beer. He noticed for some months past that he has been obliged to rise during the night to make water; and that if he was much confined his feet swelled slightly. In the end of February he vomited some clotted blood, and his stools were black.

On admission, he was anæmic; the skin and sclerotic slightly icteric; the eyelids were distinctly œdematous; the tongue was furred; the appetite poor; the bowels constipated. The liver was of normal size; the spleen measured 3 inches vertically, and $4\frac{1}{3}$ inches across. The red corpuscles of the blood were pale and flabby, and the white were not increased in number. The heart and lungs were normal. The urine was, on the day following his admission, 50 oz., of specific gravity 1015; of a straw colour; acid reaction; contained a slight mucous cloud; otherwise normal. The following day, how-

er, he made more water, about 100 oz., of specific gravity 1010; and he continued ever since to pass that amount at least, every day. Albumen has not been observed. His general health has somewhat improved; but a neuralgic pain has appeared, the œdema of the eyelids is undiminished, and his urinary symptoms continue. I mentioned in my former paper that I had anticipated in one case the appearance of the albumen in the urine, judging from the symptoms that an early stage of amyloid degeneration was present. It seems not improbable that in this case also we have the early symptoms, which may ere long develop themselves into something more important.

Having thus sketched the cases which I have recently observed, I shall now proceed to speak of each of the symptoms in succession, so as to indicate their importance.

The Quantity of Urine.—It will be observed that in all the cases I have mentioned, this is a prominent symptom. The increased quantity of urine being marked throughout the whole course of the disease; a diminution below the natural standard occurring only towards the end of the case, or under accidental influences. In many cases I have found that the patient was not aware of the increased flow of the urine, and only indicated it when he stated that he had to get up frequently during the night to make water, and that at each time he made a natural or excessive quantity; and thus I have found it necessary to ask them, not only whether they have observed that they made an excessive amount of water, but whether calls to micturition had disturbed them during the night.

The pathological anatomy of the disease seems to me to account very well for the changes in the amount of this secretion. The earliest manifestation of the degeneration is commonly in the transverse muscular fibres of the small arteries, and if these fibres are degenerated, it is reasonable to suppose that they are paralyzed, and so the regulating influence lost, and a congestion of the Malpighian bodies results. Unquestionably, when the degeneration has advanced, it diminishes the lumen of the arteries, and so must diminish the supply of blood; but other parts may act more vigorously, and more than compensate for the disadvantage. In the extreme stage a diminution actually does take place, and this perhaps coincidentally, as I previously suggested, with exudation into the uriniferous tubules, as well as extreme degeneration of the arteries. This view, which I maintained on a former occasion, was opposed, on the ground that, in proportion as the degeneration of the arteries advanced, their calibre became diminished, and, as a necessary consequence, a smaller quantity of blood than natural could be transmitted to the vessels beyond; and if it were true that the watery part of the urine was mainly derived from the Malpighian tufts, it seemed very strange that the secretion should be increased, for it was precisely in the vessels forming these tufts that the degeneration was found most advanced; and it was maintained that the only way in which the increase of urine could be accounted for was by a reference to Virchow's and Beale's discoveries as to the circulation in the kidney. These observers show that a considerable quantity of blood passes

directly from the branches of the renal artery into the vasa recta of the medullary portion, and from thence into the capillaries, without passing into the cortical portion at all. From this it is evident that not only in the waxy degeneration, but in other forms of disease of the kidney, where there is an obstruction of the passage of blood through the vessels of the cortical portion, an increased collateral pressure would be exerted on the vessels of the medullary portion, from which, in consequence, an increased flow of watery urine would take place, and the whole quantity passed might be above, or, at least, not below the average. But the amount of blood sent directly to the medullary portion is very much less than that sent to the cortical substance, and no one can conceive that a shutting off of the latter from functional activity could be more than compensated by increased activity in the former. To say that a set of vessels, not amounting to more than one-fifth of another set, are capable of performing all their functions, seems to me extremely unsound, and, especially in this case, untenable, seeing that the vasa recta of the medullary portion are themselves very often the seat of this degeneration, and yet the polyuria is present. The explanation seems quite inapplicable to this form of disease. Besides, it is by no means proved that merely the amount of blood in a vessel bears relation to the amount of fluid transuding through its walls; the state of these walls themselves may probably influence these transudations in a manner and to a degree that we by no means understand. I do not wish to commit myself to any theory on this point, but it seems to me that the probabilities are more in favour of my explanation than of the other. An increase of thirst and of drinking cannot be regarded as the essential cause of the polyuria, seeing that in some cases I distinctly ascertained that the amount of urine was equal to, or even surpassed, the total amount of fluids consumed.

Character of the Urine.—The pale colour, and low specific gravity, and the presence of albumen, do not require special notice. The quantity of urea I hope soon to make the subject of special inquiry.

The Tubecasts.—In the amyloid degeneration we may meet with tubecasts of various kinds, the delicate transparent casts, which were formerly called waxy, and are now better termed hyaline; these hyaline casts with occasional epithelial cells in a state of fatty degeneration enclosed in their substance, others with a larger number of fatty cells, and occasionally finely or coarsely granular casts. Occasionally we see casts containing individual cells in a state of amyloid degeneration, and presenting its peculiar reaction. The occurrence of casts, such as these last mentioned, and which may be termed the amyloid casts, would of course establish the diagnosis of amyloid degeneration of the kidney; but none of the others afford any special evidence on one side or other, for they occur in all forms of Bright's disease. Thus, the hyaline casts constantly occur in the late stages of that degeneration which follows upon acute nephritis, and are thus evidently derived from uriniferous

tubules which have been denuded of epithelium. Those which contain a few cells in a state of fatty degeneration, and derived from tubules whose cells have in so far been destroyed, but in which some still remain, and those which present the granular appearance, are either composed of cells completely broken down, or of exudative matter in a state of incipient degeneration. If we trace a case of acute nephritis, we find in succession bloody and epithelial casts, granular casts, fatty casts, the amount of fatty cells gradually diminishing, and ultimately hyaline casts. In the waxy or amyloid degeneration we see the same casts, but appearing in the reversed order. Many varieties of conditions of the tubules exist in these diseases of amyloid degeneration, and consequently we have a corresponding variety of casts. In the gouty kidney we also meet with the same forms; so that in no case can we positively conclude, unless where we have bloody or amyloid casts, as to the nature of the disease from their indications. It is true, that in the early stage of the amyloid degeneration hyaline casts prevail; but that, if unsupported by other evidence, cannot enable us to establish a diagnosis. Casts are formed by the coagulation of an exudation, or transudation poured out from the bloodvessels into tubules. This exudation, of course, encloses within it the epithelial or other elements which may be present within the tubes, and when the current of urine carries away the exudation, it, of course, carries also the enclosed matters. Thus, if it be poured out into a tubule denuded of epithelium, hyaline casts result; if into one full of cells, cell tubecasts result; if into one with a few cells, corresponding casts are formed. It is much to be regretted that the term "waxy casts" has so often been applied to the hyaline, for it has led many to imagine a relationship between these casts and waxy degeneration. The name is one which can only deceive, and should be abandoned.

Dropsy.—In some cases this symptom never appears at all; but, in the majority of instances, it occurs as a serious concomitant late in the disease, and in many at earlier stages. The patient complains that towards evening his boots become tight, though they fitted him comfortably in the morning. This state may continue for months, and only very gradually increase so as to become serious. Very commonly it first becomes severe in consequence of an intercurrent attack of acute nephritis. I do not think that it consists with the object of the present paper to enter into the causes or mechanism of dropsy; we shall therefore not say more on this topic.

Diarrhoea.—This is a very common, and frequently very serious symptom in cases of waxy degeneration. It appears to occur in all cases where the mucous membrane of the intestine has been affected. In the "Cellular Pathologie," Virchow speaks of the association of this symptom with the degeneration of the intestine as an established fact, and it will be observed that the cases I record confirm his observation.

Temperature.—I am indebted to my friend Mr Herbert Taylor for a few observations on the temperature of A. M., Case 1, from which it appears that a constant diminution by a few degrees existed, but much more extensive observation would be required to enable us to arrive at any general conclusion on this subject.

The Cachexia, and the State of the Liver and the Blood.—In many of the cases it will be observed a peculiar cachexia exists. There is a pale anæmic appearance, with occasionally a little dark pigmentary deposit in the skin, particularly about the eyelids, an air of general debility, and a pasty or waxy complexion. This would seem to be most commonly associated with the syphilitic forms. In other cases there is a characteristic appearance of the face with which I have become familiar, when the surface generally is pale and clear, but a very distinct congestion exists over both cheeks. This is not a congestion like a blush, but is seen by the naked eye to depend upon distention of narrow, small vessels, quite above the size of capillaries. These appearances, though interesting, do not seem to me important. But in many of the cases we have a distinct morbid condition of the blood, along with a slight increase of the colourless corpuscles. We observe that the red are soft and flabby, tending to tail, and form groups rather than rouleaux as do healthy corpuscles. This condition seems to depend upon affection of the spleen and lymphatic glands with the amyloid degeneration. In not a few instances the liver is found enlarged, sometimes to an immense extent, and whenever we find this condition, as well as those above indicated, we have a certain amount of evidence corroborative of the other more important symptoms.

The Previous History is often of great value in assisting us to arrive at a conclusion on the question of the nature of such cases. The fact has long been known that the amyloid degeneration is induced by long-continued wasting diseases, particularly syphilis, caries, and necrosis, and thus it is obvious that the fact of any of these having occurred in the previous history is in so far an evidence that the case of Bright's disease is one of this particular form. At the same time, it is by no means a constant occurrence that these maladies precede the degeneration, and they are therefore not to be looked for in every case.

The Duration of the Disease is evidently, from some of the instances recorded, very protracted. One of my cases (A. M.) has been under observation for upwards of four years, and though it was during that period that his albuminuria first appeared, we have no positive proof how long the polyuria had previously existed. The case also of E. B. was under observation for more than three years and a half, and when he first attracted my attention he had for some time been affected. The woman E. H., whose body was examined in June, had been under observation for four years, and had throughout presented the same characteristic symptoms. In many cases, then, it would appear to be very chronic, and I have not yet

I have seen a case from the very commencement of the renal symptoms to its fatal termination. The health of those who are suffering from the malady is never good; they are weakly, and have a great want of vital force, and are apparently very liable to other affections. They are subject to pains, aches, hæmorrhage; but on the whole do not suffer much from their degeneration, unless when it happens to occur in the intestine, when the wasting diarrhœa becomes a distressing symptom.

The Modes of Termination of the Cases.—A large majority, indeed almost all, seemed to pass on to a fatal termination; but from two cases, Nos. 15 and 17, I am inclined to think that it is not invariable. In both of these instances the albuminuria disappeared from the urine, and even the quantity of that fluid became diminished under the influence of tonics and good diet and regimen. In one of them this has gone on to what seems a complete recovery. In the other, relapse occurred so soon as she was deprived of the favourable surroundings in which she had been temporarily placed.

When it terminates fatally it would seem to lead to death in a variety of ways, most commonly by a disease superadded to the degeneration, sometimes an inflammatory affection of the kidneys, sometimes a disease of the bronchi, and sometimes from the ordinary concomitants, such as phthisis pulmonalis. In no case have I seen a patient die simply of the degeneration or its direct consequences; there seems to be always another disease superadded.

Treatment.—The cases which I have recorded render it perfectly evident that, under judicious treatment, the symptoms of this degeneration may be greatly ameliorated, and perhaps the degeneration itself cured. The rules which seem to me most important are, 1st, To attend to the nutrition of the patient, giving good nutritive food in the forms best suited to the individual tastes and powers of digestion; 2d, To give such tonic medicines as may improve the appetite; 3d, To give such hæmatic medicines as control the tendency to anæmia, and among these pre-eminently the syrup of the iodide of iron; 4th, In all cases in which a syphilitic infection has been traced, and even in many others, to give the iodide of potassium in moderate and sustained doses. The effects of these medicines are often very striking, and in particular the influence of iodide of potassium in diminishing the bulk of the liver is most remarkable. Again and again I have seen the size of the organ diminish under its use. In many cases all that we can do is of little or no avail, and the patient becomes worse and worse, and ultimately sinks.

Let us now glance at the amount of evidence we have collected. I have recorded in my two papers thirty-four cases, in all of which a certain series of symptoms was observed, which symptoms I associate with the waxy or amyloid degeneration of the kidney; one of the forms of Bright's disease. In nineteen of these cases a post-mortem examination has been made, and in all of them the

expected lesion has been found. In no case hitherto have I examined a body expecting the lesion and not found it. This evidence seems to me to prove that in many cases of the degeneration the symptoms are such as I describe, and are so distinct as to enable us positively to distinguish it from other forms of renal affection. But I by no means assert that I have absolutely established my views, and still less that I shall not likely require to modify them. I recommend the subject anew to the attention of the profession, anxious to test my observations by the general experience, and only recommending a very careful sifting both of the history and symptoms before a diagnosis is attempted.

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16

ON
CERTAIN RESULTS AND DEFECTS
OF THE
REPORTS OF THE REGISTRAR-GENERAL.

On CERTAIN RESULTS and DEFECTS of the REPORTS of
REGISTRAR-GENERAL. By WILLIAM LUCAS SARGANT, Author
of "Social Innovators and their Schemes," "Science of Society,"
"Opulence," &c.

[Read before the Statistical Society, 16th February, 1864.]

THE principal conclusions at which I arrive in the following pages are these:—

1. Comparing the last decennial period (1851-60) with the previous one (1841-50), the improvement in the rate of mortality is very small, and is far from fulfilling the expectations of sanitary reformers, p. 175. The excess of mortality in towns as compared with that of rural districts, is an evil too deeply seated to be corrected by improved drainage and water-supply, p. 177.

2. The rate of mortality among young children has been greatly exaggerated; partly through an erroneous mode of calculation, p. 181.

3. The infant death-rate of London is low: the death-rate of London children *past* infancy is singularly *high* by comparison, p. 198. The Bethnal Green statistics are remarkable, p. 199.

4. The rate of farm wages has little comparative influence on the death-rates of counties, p. 184.

5. Dr. Gairdner's opinions published in the "Social Science Transactions for 1860" are unfounded, p. 204—207.

6. The *male* death-rate is the true test of comparative mortality, p. 179.

7. In comparing one place with another, the *ages* of the inhabitants must be taken into account. More deaths will happen in a healthy foundling hospital than in an unhealthy barrack, p. 173.

8. The *classes* of society must also be taken into account. It is useless to compare Whitechapel with Clifton.

9. In comparing one town with another, we must take the *borough* and not the parish which bears the name of the borough. The Registrar-General takes the parish in some cases; and in other cases a large district with the town for its centre, p. 187.

10. Neglect of the precautions mentioned in 6, 7, 8, and 9, has led to some false inferences. Of the very great provincial towns Birmingham is the healthiest: but the Registrar-General represents it as *less* healthy than London by $\frac{2\frac{1}{2}}{1000}$ or $\frac{3}{1000}$; I contend that it is considerably *more* healthy than London, pp. 203, 204.

11. Some alterations are required in the Registrar-General's Reports. Every volume ought to have a preface with instructions to

inquirers: with examples of modes of calculating the rates of mortality: with the latest life table, male and female, or notice where to find it, pp. 207—210.

The boroughs ought to have their mortality given: and the substitution of parishes and districts in the places and under the names of boroughs ought to be abandoned.

The tables occasionally given, *e.g.*, at XX, xix, should be explained in an intelligible manner, p. 196; and a distinction should be drawn between the two modes of calculating the death-rates:—viz. from the number left alive, and from the number exposed to the risk of death, p. 81.

A better and fuller 10 years' volume is wanted, with male and female population distinguished; and with columns of percentages for every district, sub-district, and borough, pp. 207, 208.

Introduction.

The title of this paper indicates my intentions in writing it. I have presumed to think that the Registrar-General fails to supply us with some results that it is important for us to know; and further, that the returns themselves are as yet imperfect. The general excellence of the reports is confessed by all; and if I had undertaken the task of forming an estimate of their value, I should have had to perform the first and most pleasing duty of a critic, by praising the cautiousness of their materials and the lucidity of their arrangements. The task I have set myself is a far humbler one: it is to call the attention of this Society to some parts of the reports which, as I have found, present needless difficulties to inquirers; as well as to suggest and partly supply final results hitherto withheld.

When the system of registration was established more than a quarter of a century ago, the first object proposed was, to furnish Parliament with facts necessary for sound legislation as to the marriages, births, deaths, and health of the people. This object has undoubtedly been to a considerable degree attained. The conclusive evidence supplied of the comparative unhealthiness of towns, has led to sanitary measures which have not altogether failed to lessen the mischief. The standard of average mortality deduced from the registers, demonstrated the murderous waste of life that had long been going on in our barracks; and introduced changes which, we are told, have greatly lessened the evil. I wish it were found possible to go a step further, by carrying into effect the authoritative suggestion of employing the soldiers in trades. Perhaps it is to the same ascertained standard that we must attribute the present movement in favour of our Indian army: though to condemn its sanitary management it was unnecessary to go farther than our own barracks, which, unhealthy as they were, were palaces of health compared with

those of India. On the whole then, the Registrar-General's work has not been barren.

The reports however, are mines to be worked by men who are legislators. All students of social economy should naturally refer to them for materials: so should those who want sanitary information as to a county or a town; particularly the members of town councils. To such inquirers the greatest facilities ought to be given by an intelligible arrangement of the tables, by copious indexes, and by preliminary instructions. I shall have to point out many deficiencies in these respects.

Prudence compels me to confess that many errors may be found in the schedules I have appended. The calculations I had to make were so numerous as to occupy part of every day during six months, and I know by experience that I cannot attain perfect accuracy: I do hope that there is no blunder of sufficient importance to vitiate my conclusions.

I.

In the appendix will be found three Tables, A, B, and C: I will proceed to explain these, column by column.

Appendix A.—Table A has a series of figures relating to England and Wales, to London, to 39 English counties, to the town-ridings of Yorkshire, as well as to North Wales and South Wales, each reckoned as one county.

Column 1—contains simply the population of each division determined by the recent *census*.

Column 2—contains the population of each division as given by the Registrar-General. An uninitiated person is surprised to find that these two enumerations vary considerably: Bedfordshire for example appearing in one column with 5,000 more persons than in the other column; Berks with 30,000 more. The explanation is this—the Registrar-General, on commencing operations in 1837, instead of dividing the country anew, adopted the districts already formed by the Poor-Law Board; and these divisions, made for the convenience of pauper management, occasionally absorbed a corner of one county in a union of another county. Such allocations, if well explained in the registers, would not be inconvenient. But at present they are not well understood except by experts, because no warning to inquirers is prefixed. Thus, if I want to find Edgbaston I look in the index, but it is not there: I search through the subdivisions of Warwickshire, but in vain: if I possess unusual patience I discover my parish at last removed from its own county to Worcestershire. I have now learnt the lesson which a preface ought to have given me; but a casual inquirer generally shuts the volume for ever. This evil would be easily remedied.

Columns 3 and 4—give the density of population in each division. All know that a town life is unfavourable to health, and that a closely packed population has a high rate of mortality. In column 3 I have the number of acres to each person: the number being for England and Wales less than 2; for London $\frac{1}{50}$ th; for Westmoreland nearly 8; for North and South Wales 4 to 5. But this test of crowding is imperfect; because a particular division, North Wales, with 5 acres to each person, might have 4 acres taken up with woods and wastes and waters; while the inhabitants were generally packed in a few towns. Column 4 is intended to correct this possible error: I constructed it by adding together in each county, the population of all the towns enumerated in the census, and then comparing this total urban population with the total rural population of the same county. I find that in Bedfordshire, Cambridgeshire, the North Riding, and some other parts, the rural population is about twice as great as the town population; whereas in North Wales it is eight times as great, in South Wales and Westmoreland four times as great, in Huntingdonshire and Rutlandshire three times as great: that in Nottinghamshire, Worcestershire, the East Riding and the West Riding, the town and the country are about equal; but that in Lancashire, Warwickshire, and Surrey (extra metropolitan) the rural population is only half that of the towns. And this column No. 4 does not give the same results as the previous column of acreage to persons; as may be seen by comparing Westmoreland and North Wales. I have perhaps made a mistake in taking all the towns in the census, *i.e.* all towns of 2,000 inhabitants and upwards: if time and patience had permitted, I would have given other columns limited to towns of 5,000, 10,000, or 20,000. I believe however, that column 4 as it stands supplies a better test of crowding or over-crowdedness, than does column 3 with only the acreage per head.

Column 5.—In the fifth column I copy from the census the decennial increase of the counties; which is great in some, and small in others, while in five instances there is a decrease. The high rate of increase is generally found where great towns prevail; though there has been a marked increase in some counties in which, as seen in column 4, the rural population is greatest; as in Essex, Herefordshire, and Wales.

Specific Mortality.—One point is here deserving of attention. The ages of persons living and dying in one place vary considerably from the ages of persons living and dying in another. Dr. Price, in the absence of any enumeration, conjectured that in consequence of the large immigration of young persons, the towns contained a superabundance of the healthiest ages; and he contended that the numerous deaths in towns were the more disgraceful on that account. On the other hand it might have been guessed that the

adult immigrants soon married and had a brood of children, and the inevitable prevalence of deaths among these children, increased the apparent mortality of the towns. In a foundling hospital which only retained the children till 5 years old, the death-rate would be numerically high, however healthy the children might be; and a town with an abnormal number of young children would in this respect, though in a low degree, resemble a foundling hospital. The high numerical mortality so caused, would not prove unhealthiness. Dr. Price's conjecture and the antagonistic conjecture could be tested only by a comparison of facts.

Seven or eight years ago,* I spent some time in comparing what I ventured to call the *Specific Mortality* of all England, Cornwall, London, Liverpool, Manchester, and Birmingham. I must content myself with stating that I found the differences less than I had suspected: that taking 1,000 deaths as the standard, Cornwall was worse than it appeared by 18; London was worse by 29; Liverpool (much damaged by cholera and Irish famine) was worse by 68; Manchester was better by 9, and Birmingham was better by 28. Thus, comparing the two extremes, London and Birmingham, there was an appreciable difference of $\frac{57}{1000}$, or nearly $\frac{1}{18}$ th part.

A misunderstanding of this principle has made it appear as an apology for parental neglect. Now there are two ways in which a place may have a high infantile mortality:—the first is the existence of an abnormally large number of infants; the second is the prevalence of parental neglect or other circumstances unfavourable to infant life. The former is the case with which we are now dealing. But in no case can the deaths of 1,000 infants be held to indicate the degree of insalubrity which the deaths of 1,000 youths indicate.

Column 6—gives the number of persons living on an average in each house. On this I have only one remark to make:—that though a low average is generally satisfactory, as showing the possession of a separate house by each family, yet a higher average is in particular parishes a result of opulence; because among the richer classes the family is increased by the domestic servants; so that in St. George's Hanover-square for example, a high average in a house does not indicate crowding as it does in Shoreditch.

Columns 7 and 8—supply the rate of mortality in each county, as well as for London and for the whole country: first for the ten years ending at Christmas 1850, and then for the ten years ending at Christmas 1860. The former I have had to calculate for myself: the latter I copy from the table of the register (XXIII, xiv).† By

* "Economy of the Labouring Classes," 445.

† The Registrar's figures are slightly different from mine. The death-rate is commonly reckoned to be $\frac{10 \text{ years' deaths} \times 100}{\text{average population}}$, giving for all England and

ancing from one to the other, we can judge of the sanitary progress in each county.

For all England and Wales the death-rate during the earlier period was 22·28 to the 1,000: during the latter period it was 22·16. These two numbers approximate so nearly as to prevent us from claiming any palpable improvement during the second decade. Nor shall we derive any comfort from going back to an earlier register; for the death-rate from the commencement of the register to 1845 is only 21·76, a number lower than those I have given by about a fourth part. Remembering the inevitably crude state of the registers in their earlier years, I think little of this second comparison; but on the whole I feel that the absence of progress is a severe disappointment. While by a few years of earnest effort the mortality among our soldiers has been reduced to a comparatively low rate from a shamefully high one; while we confidently hope that an equal and a greater improvement will soon be effected in our barracks abroad; we have to confess that our boards of health, our inspectors of nuisances, our millions spent on drainage, our grand aqueducts and our subterraneous rivers, have left us to die as we died before. We still hear that this place has ceased to be a charnel-house since its thorough drainage was completed; that the closing of the cellar-dwellings has saved thousands of lives annually: but when we get at the totals of the kingdom, we have lost in one part what we have gained in another.

Even under this discouragement I do not regret the costly efforts which we have made to purify the country. It is in itself an excellent thing to banish filth and stenches and to secure a purer water to drink. Besides, though the number of lives saved has not been large enough to tell sensibly on the registers, yet the most miserable of our people must have been spared much suffering and some demoralisation.

The percentage in our favour too, is somewhat larger than it looks. Our population becomes in each decade more urban and less rural: we ought to learn whether this variation accounts for our slow progress.

Of the increase of two millions from 1851 to 1861, far more than half belongs to the counties in which there is a prevalence of towns or mines: to Middlesex, Kent, Surrey, Hants, Lancashire, Cheshire, Staffordshire, Warwickshire, Durham, Northumberland: and even in

Wales 22·16 against the Registrar's 22·24; and for London 23·63 against the Registrar's 23·77. For the purpose of comparison with previous periods the difference is worth noting. The difference is caused by the Registrar-General's including in the average the intercalated years, instead of confining the calculation to the two extremes from which the intercalated years are reckoned. This mode is more accurate, but too tedious for ordinary purposes.

counties which have a predominance of rural population, as Cornwall, Derbyshire, Northamptonshire, the increase may have taken place in towns. But let us see what result would follow if we assumed the whole 2 millions of increase to have taken place in towns; and we assumed further that at the penultimate census of 1851, the town and the rural population were equal. We should then have,

In 1851 9 millions in towns, 9 millions in the country.
 „ '61 11 „ 9 „

If we turn to the Register XXI, xxx, we shall find the population divided in a similar way, but with a considerable preponderance of rural population. The respective rates of mortality are set down at 20 and 26½. Assuming the same difference from 1851-60, the calculated death-rate of 22¼ gives 19 for the country death-rate and 25½ for the town. The account will then stand thus :

Assumed Mortality :—

		Average.
1851	9 millions of town at 25½ and 9 millions of country at 19 =	22·25.
'61	11 „ 25½ „ 9 „	19 = 22·58.

From this it follows that on the assumptions I have made, the last decennial death-rate ought to have been '33 in the 1,000 worse than the previous decennial death-rate. But the case is not really so strong as this; and even after allowing for the small improvement exhibited in columns 6 and 7, the advance is too trifling to be worth notice: for if the year 1860, instead of being a favourable one, had been as unhealthy as 1854, the improvement for the 10 years would have disappeared. Any conclusion founded upon so slight a variation, is open to the censure passed by Professor Radicke on rash inferences in the case of medical observations.

For the sake of simplicity I assumed that the decennial increase of 2 millions took place in towns; but it should be observed that so large a part as 840,000 was added by London and Lancashire; and further, that the fall in the death-rate of both of these was so considerable, that the two together did not weigh more heavily in the scale during the second period than during the first.

I am obliged to conclude therefore, that the result of our national efforts for purification has been, as regards the death-rate, something like a failure; and that it has by no means realised our magnificent expectations of reducing the mortality of towns to that of the country as it was, and of reducing the mortality of the country to that of Grayrigg in Westmoreland, or of Calbourne in the Isle of Wight.

I have for some years suspected that too much stress has been laid on external causes of death; particularly on bad drainage and

pure water : and that any great general reduction of mortality must be effected by means far different from the laying out of millions, or scores of millions, of money. As to towns:—people generally live and work under cover. Now Mr. Neison has long inferred from his observations on friendly societies, that the difference of longevity in town and country, is not principally caused by the quality of the air breathed: for he has found that sedentary pursuits in the country are something like as injurious as they are in towns. It is not so much *country* air that is wanted as town air. But I have no hope of inducing our mechanics to pull out their glazed windows: nor am I sure that they could do their nicer work with numbed fingers. Much less could we get textile factories thrown open. And I see no other way of giving to in-door occupations the salubrity of those carried on out of doors.

Then as to both town and country, there are the questions of habits, of morals, of education. Improve these, and mortality will diminish: but how slow is the progress! I do not despair of raising the working classes to the present level of the middle classes, and I hope that my great-grandsons may see the improvement. Happily, such a change would probably be permanent; and I no more fear that, in the ordinary course of events, the lower classes once raised will sink again, than I fear that the educated classes will relapse into the drinking, swearing, practices of their grandfathers.

Comparing our death-rate with that of other countries, we have moderate grounds for self-gratulation. We much surpass Russia and Germany; and our small superiority over France is augmented by the necessary allowance for the greater prevalence of our towns over our rural districts. If we go to Sweden, we find that its long-continued and accurate statistics prove a lower mortality than ours (*Statistical Journal*, xxv, 111); but the paucity of Swedish towns vitiates the comparison; and a separation of the town and the country (*Id.* p. 169) shows that the Swedes are inferior to us, especially in the towns. Norway, we find, during 30 years had the low death-rate of 18, a singularly favourable condition even for a purely agricultural people. Belgium from 1841-50 had a death-rate little exceeding ours.

Coming to those parts of our own country not included in the Registrar-General's Reports, Ireland has only now the first promise of a register. It has been conjectured that its mortality, in the absence of famine, is low: a strange result, if it be such, of chronic equalor and destitution.

Scotland has had a registration during several years, and the returns are remarkable. The lower Scotch, compared with the lower English, are a dirty people; worse housed, more addicted to spirit drinking, and exposed to a severer climate: yet they live

longer. Our Registrar-General attributes this superiority, as have attributed that of Sweden, to the less prevalence of town populations; but the explanation is questionable. Scotland indeed has no metropolis of three millions, but Glasgow is as large to Scotland as London is to England. Edinburgh weighs as heavily on the Scotch scale as the aggregate of two or three of our largest towns in the English scale. Comparing the two registers (Scotch Register IV, xxviii and English Register XXI, xxx) we find that the Scotch town population is more than a third of the whole, and the English town population is less than a half (.37 to .46): a trifling difference. Some allowance however, is due to the fact that the mortality of towns is apt to increase in a geometrical ratio as the numbers increase; though this is not true of our greatest town, London.

Let us now appeal to the Scotch Registrar. In his Fourth Report (pp. xxv and xxviii) he says that in the Insular Districts the death-rate is only 14.6 in the 1,000. This applies to 162,000 persons; a number relatively equal to a million in England. We find no such low rate among ourselves. Little Rutland, with 23,000 has a death-rate of $\frac{18}{1000}$: Surrey with 273,000 and Westmoreland with 61,000, are above $\frac{18}{1000}$. Thus 357,000 people in the healthiest of our counties have a death-rate of 18 at least: an excess of a fourth above that of the Scotch insular districts.*

The Scotch mainland rural districts have a death-rate of $\frac{17\frac{1}{2}}{1000}$, and these contain more than half the population. Our rural districts have a death-rate of 20; *i.e.* an excess of $2\frac{1}{2}$ above those of Scotland. (English Registrar-General XXI, xxx.)

On the other hand, our town districts have a death-rate of only $25\frac{1}{2}$ against $26\frac{1}{2}$ in the case of Scotland.

I therefore conclude that notwithstanding dirt, cold, and whiskey, the north of our island has a decided superiority to the south, in the rural districts, but some inferiority in the towns. It appears also, that a Scotchman by migrating from the country to the town, loses more than an Englishman does by the same change; the Scotchman losing $\frac{9}{1000}$, the Englishman only $\frac{5\frac{1}{2}}{1000}$: and perhaps it is here that the dirt and the whiskey produce their fatal effects. The farm-wages of Scotland are now something higher than ours, but there is not any notable difference. It is worth inquiry whether the superiority of Scotch education, as shown by the marriage signatures, is not an important element in the estimate, especially with reference to the judicious treatment of infants. London, with a comparatively

* From a paper read by Dr. Farr before the Royal Society, 7th April, 1859, it appears that in the "Healthy Districts" of England, from 1849-53, the death-rate was $\frac{17\frac{1}{2}}{1000}$. See p. 864.

gh state of education, and a low infant mortality, strengthens this presumption.

Column 9.—My next column gives the death-rate of males only. The Registrar-General in one of his earliest reports, propounded an opinion, that the respective occupations of the two sexes made the female death-rate more uniform than the male. The reverse seems to be to be true.

If we compare one place with another, we find that the proportion of males to females varies greatly, though in most cases the women are the more numerous. The excess of females is occasionally very large. It is not the manufacturing districts which furnish the most remarkable examples: for Manchester, Salford, Bradford, have a female excess of only 11 to 15 per cent.; while Birmingham has only 5 per cent., and Sheffield has even a small excess of males. It is in the parishes where persons of independent means congregate that the disproportion is most marked: as, for example, in St. George's Hanover square, where females predominate by 34 per cent., and females over 20 years old predominate by 44 per cent.; and still more in Leamington which has 43 per cent. more females, in Edgbaston parish which has 45 per cent. more, and in Clifton which has 73 per cent. more. It needs no argument to prove that the larger part of this surplus consists of domestic servants.

Now it has long been remarked that this introduces a disturbing element into the calculations of mortality. Domestic servants are for the most part of very favourable ages; with the sickly members eliminated; to a great extent immigrants from other parishes, who seldom die in service, but rather in their relations' houses or in hospitals. Therefore, for such places as Hanover Square or Leamington, the male mortality is the more instructive. I will pursue this topic further when I explain my Tables B and C, of town populations. I will only remark now, that the excess of females over males for all England is rather more than 5 per cent.; that the excess in London is almost 15 per cent.: that the male death-rate for all England exceeds the general death-rate by only 8 in 10,000, while the excess in London is 19 in 10,000. It appears therefore, that the female servants in London much disturb the general death-rate; and that resorting to the male death-rate as the truer test, London instead of being only $1\frac{1}{2}$ worse than all England, is more than $2\frac{1}{2}$ worse.

In a few of the counties, the male and the female death-rates vary singularly. In Bucks, Northamptonshire, and Rutlandshire the male death-rate is less than the female: in Derbyshire and Durham they are nearly uniform.

Dismissing the comparison, and looking at the male death-rate

only, we find that of the counties, Lancashire is the worst with 27, then come Staffordshire and the West Riding with 25; Warwickshire with 24; Cheshire, Durham, Monmouthshire, Northumberland, Nottinghamshire, and the East Riding with 23. It will be asked whether this male death-rate does not increase, just as the prevalence of the town population increases. My column 4 enables me to answer that this is not so. Lancashire and Warwickshire have just the same proportions of town to country, but their respective male death-rates are $27\frac{1}{2}$ and 24: London is nearly all town, but its male death-rate is almost 2 less than that of Lancashire, which has considerable rural district.

The best counties as to male deaths are Rutland and Surrey with 18; Westmoreland with 19; Dorsetshire, Essex, Herts, Lincolnshire, the North Riding, Salop, Suffolk, and Sussex, all with 20.

But here is another defect, as I think, in the Registrar's volumes. In order to calculate the male death-rate, we must know the number of male deaths and the number of males living. The register supplies the one but not the other. The male deaths are scrupulously recorded; but the male population is not separated from the female. To have to refer to the census is a trifling obstacle to me, but it is a formidable obstacle to an occasional inquirer. And even on me a wearisome task is imposed.* The census very properly furnishes a multitude of particulars but not the totals. For example: to calculate the male death-rate of Bolton, I ascertain from the Register, XXIII, 234, that Bolton lost in 10 years 17,028 males: but turning to the census for the male population, instead of finding this given in one line, I learn that Kersley township had 2,043 in 1851 and 2,424 in 1861; that Farnworth had 3,085 and 4,113 respectively; and so on through every sub-district and every minor division of every sub-district of which the district of Bolton consists. To get my totals I must add up two columns each containing 30 lines. The register ought to supply these totals. The case of York is worse; for it requires the adding up of two columns each of 96 lines: and Chester has two columns each of 120 lines. The counties fortunately, have the totals given (Census I, 194), but these should be copied into the register.

Column 10.—I arrive now at columns which raise questions of peculiar interest:—I mean as to the death-rate of young children. Sanitary reformers, in their zealous advocacy of improvements, have

* I leave this passage as I read it to the Society; but the totals have been pointed out to me in another part of the census. I had trusted too implicitly to the census index, which gives no reference to the places where the totals occur. The logical arrangement of the census is excellent; but for reference a full index surpasses the best logic.

ade statements of a shocking character. Seventy years ago, Arthur Young told his readers that the London Foundling Hospital made a boast in 1756, that only three-fourths of the children died in the year. We learn also from official authority, that in Dublin about the same time, the Foundling Hospital lost nearly half the children even before they were sent out to nurse. As to the present day, loose statements are made, about a frightful mortality in some parts of England. Dr. Gairdner, an eminent Edinburgh physician, asserts ("Social Science Transactions, 1860," 644) that in the great towns far more than one-fourth of the infants die in the first year. In an early number of the *Journal* of this Society (v, 230), appears a calculation made by the Secretary of the Poor-Law Commissioners, from which it appears that among agricultural labourers, artizans, and servants, half the children die under 5 years old. Such assertions though authoritative are baseless; but a hundred pens reproduce them.

I am acquainted with three modes of arriving at these inaccurate results :

1. The first of these consists in calculating the mean age of those who die, and in assuming that as this age is high or low, the rate of mortality is high or low: it overlooks the fact that in whatever institution, or neighbourhood, children are unusually numerous, the mean age of the deaths *must* be low.

2. The second mode is founded on the proportion of young deaths to all deaths. In England, the male and female deaths under 5 years old, are about two-fifths of all deaths. The false conclusion is drawn, that two-fifths of the children born, die under 5 years.

The Registrar-General has condemned both these modes, and has pointed out that they both omit the consideration of the number of children living. With a given condition of health, the number of deaths must be in proportion to the number of children among whom deaths can take place.

3. But as far as I know, the Registrar-General has not condemned the third mode. This consists in calculating the deaths from the number of persons left alive, instead of from the number who have been exposed to the risk of death.

If 1,360 new-born infants are placed in an asylum on the same day, and if their number is reduced by death, in 5 years, to 1,000, the quinquennial death-rate is $\frac{360}{1360}$ or $\frac{265}{1000}$; but the mode I condemn would call the death-rate $\frac{360}{1000}$. The difference between 265 and 360 is very large. I give this imaginary case merely as an illustration of the *principle*.

The case I originally gave was a different one, and assumed the introduction of new-born infants from time to time, to fill up the gaps in the numbers. To this it was objected that the infants so

introduced after the first day, were not exposed to the risk of death during the whole 5 years.

The question is, I confess, a very difficult one: to discuss it fully would require more space than I have at command. But those who object to my proposed mode, have two points to consider. First, my proposed mode, applied to the Census of 1851 and 1861, gives a result as to childrens' deaths pretty nearly the same as the result deduced from the births: secondly, my proposed mode gives a result not very far from the same as that in the life table (Registrar General, XII). On the other hand, the results obtained by the mode I condemn, very wide of those deduced from the Censuses, and from those of the life table. Judged by results, my mode is right and the other is wrong.

My column 10 gives the death-rate of male infants under 1 year old; and I will first enumerate the best of the counties in order of merit. In all England the deaths to 1,000 are 161: in Westmoreland 104; Rutland and Surrey (extra metropolitan) 126; Hants, Sussex, and Devon 130; North Wales 131; the North Riding 136; Herefordshire and South Wales 137; Cornwall, Cumberland, and Herts 139; Kent and Middlesex (extra metropolitan) 141; Salop 142; Oxon 145.

In order of *demerit*, (against 161 for all England) we have Lancashire 192; Staffordshire 182; East Riding 181; Notts 180; West Riding 177; Warwickshire 176; Leicestershire 175; Norfolk 174; Bedfordshire and Cambridgeshire 172; Cheshire 170; Huntingdonshire 164. London has only the same number as all England;—161. This is for the first year of life, and for boys only: the deaths of girls are fewer by far.

Column 11.—I now come to the deaths in the 2nd, 3rd, 4th, and 5th years of life; *i.e.*, of children under 5 omitting the first year. We might expect to find that this column would follow the proportions of the last; that counties fatal to infants, would be about equally fatal to children past infancy: but this is not altogether the case. The most remarkable exception to uniformity is London, which loses only about as many infants as the whole kingdom, but which loses nearly *one-third more* young children (over 1 and under 5) than the whole kingdom. I will reserve my remarks on this example till we come to Table B.

There are several counties which vary in the opposite direction: *i.e.*, in which the infants die relatively faster than the young children. Bedfordshire, Cambridgeshire, and Norfolk, are examples. Column 14 gives the ratio for each county, and I shall come to it immediately.

As to the absolute number of deaths of young children over 1 and under 5, the rate per 1,000 is as follows. All England and

es 105; London 137; Rutland 56; Westmoreland 64; the North
ng 66; Herefordshire 67; Suffolk 69; Lincolnshire 70; Herts 73;
atingdonshire 74; Norfolk 76; Salop and Somerset 77; Dorset
Sussex 79; Wilts, Oxon, and North Wales 80; Northampton-
e 81; Surrey (extra metropolitan) 84.

The bad counties come thus. All England 105; Lancashire
; London 137; Staffordshire 126; Warwickshire and Mon-
thshire 113; Durham and the West Riding 111.

Column 12.—My next column includes the results of the two
vious ones, by giving the death-rate of children from birth till 5
rs old.

I have already mentioned the exaggerated statements made on
s topic, by persons who erroneously believe that in some places
f the children die under 5. I shall show presently that this is
; true of the worst town in the worst county; and is far from
ng true of any other place.

The worst counties lose as follows. All England 266; Lanca-
re 336; London 298; Staffordshire 308; Warwickshire 289; the
est Riding 287; Durham and Notts 275; the East Riding 272;
eshire 271; Leicestershire 268.

All these numbers are for boys only: a return of boys and
rls together would be more favourable. Then we ought carefully
recollect that the prevalence of towns in any county makes a
gh death-rate inevitable. In Lancashire and Warwickshire the
wn population is more than twice as numerous as the rural popu-
tion (100 to 43): whereas in Leicestershire the rural population
much in excess (137 to 100).

Column 13.—Some persons would feel sure that the death-rate
f children in each locality, would follow the general death-rate of
ne same locality. Other persons would expect an abnormally high
venile death-rate in places where women are employed away from
ome. It may be true also, that particular climates are favourable
o one age rather than another: that the mildness of South Devon
may spare the fragile constitution of infancy, while the severer air
of Yorkshire may brace the nerves of parents. My column 13 is
an attempt to make the comparison between the infantile and the
general death-rate.

In all England and Wales, the death-rate under 1, is 7 times as
great as the general death-rate: in London it is over $6\frac{1}{4}$ times as
great (6.26); Bedfordshire goes up to 8 times; Lincolnshire and
Cambridgeshire about the same; Northamptonshire nearly the
same; Norfolk, Notts, the East Riding and Leicestershire to a little
under 8. London as we have seen, stands singularly low (6.26); yet
Hants is still lower (6.19), and Devonshire is as low as London. Many
other counties are a good deal lower than the average of England.

Still confining our attention to the ratio of infantile to general death-rate, we see that it is not in the great manufacturing countries that the ratio is high. Even Lancashire with its frightful loss of infants, loses its people of other ages in equal proportion.

Column 14—is the one to which I referred, in comment upon columns 10 and 11: it is a comparison, not of young with old, but of young with young. I was led to it by the remarkable contrast in London, between the mortality of infants and the mortality of other young children.

I will use the word infants here in the sense of all children under 1; and the word children for all children over 1 and under 15. Comparing, throughout the country, the deaths of children for the four years with the deaths of infants for the one year, they are 65 to 100; so that for each year on an average they are only one-sixth as numerous. Against 100 infants all England loses 16 children each year: London loses 21; Lancashire, South Wales, and Monmouthshire 19; Devon and Hants 18; Northumberland $17\frac{1}{2}$. The lowest ratios are in Lincolnshire, Norfolk, and Rutland, 11; Suffolk, Northampton, the North Riding, Herefordshire, and Bedfordshire 12; the East Riding, Bucks, and Cambridgeshire, $12\frac{1}{2}$. We must remember that these are only proportions: Devon, *e.g.*, stands unfavourably, not because it loses many children, but because it loses very few infants; and London looks far worse than Lancashire partly because it loses more children; to a great degree because it loses far fewer infants.

Column 15.—I have added two columns for the convenience of those who are disposed to conjecture the causes of the varying mortality. The first gives the rate of farm-wages in recent years according to Mr. Purdy's valuable paper. (*Statistical Journal*, xxiv, 328.) We know from other documents,* that the middle and upper classes are longer-lived than the labouring class; and that this is especially true of children. We naturally inquire whether within each class the more affluent are longer-lived than the less affluent: whether, *e.g.*, the well paid labourer lives longer than his ill paid brother.

There are two distinct kinds of labourers, the town and the country: we know that town wages are far higher than country wages; we know also that town mortality is not lower, but far higher, than country mortality. So far the deaths increase with the affluence. But the superiority of country labourers is probably owing to their working out of doors, and not to their low remuneration. It is probable at the same time, that the high wages of many

* See Vital Statistics of the Society of Friends in *Statistical Journal*, xxii, 221: and of the Peerage in *Statistical Journal*, xxvi, 54.

zans shorten their lives by furnishing an excessive allowance of
r and spirits.

The really valuable comparison however, is between one town
district with another, and between one rural district with another.
In all the counties, Northumberland, Cumberland, and Westmore-
land, have the highest farm wages; and the male mortality there is
pretty good, good, and very good, respectively. The four counties
in which the farm wages are lowest, are Devon, Dorset, Wilts, and
Hereford; and in all these the male death-rate is at least good.
Taking the aggregate death-rates of these seven counties, the ill paid
are to the well paid as $\frac{20.5}{20.9}$, giving a trifling advantage to the ill paid.
Among children under 5, the ill paid have also a small advantage,
as $\frac{21.9}{22.1}$. No one will suppose that the low wages of the south are
the cause of this trifling superiority; but I think we must infer that
even these miserable wages are sufficient in the south to maintain
health. The average wages of the three highest counties are 14s. 5d.:
those of the four lowest are only 9s. 3d.; a difference of more than
5s. a-week. Gladly therefore, as I would see an augmented rate of
wages among the southern labourers, I cannot hope that the im-
provement would of itself much lessen the rate of their mortality.

(I should mention that my averages are struck roughly, by
counties, and not by the aggregate populations of the counties, *i.e.*,
Devonshire for instance, with a population of 584,000, counts for as
much as Herefordshire with 124,000).

Column 16, the last of this table, gives the number of women in
each county who sign the marriage register: a test of education
generally accepted as the most accurate we can get. I have given
the women's signatures rather than the men's, because the state of
instruction of mothers has the more direct bearing on the health
of children.

It is remarkable (Registrar-General XXIII, vi) that in 12
counties (reckoning North and South Wales each as a county),
more women than men can write: the difference being as much
as from 5 to 8 in 100 marriages. In many counties however, there
is a decided superiority on the male side: as in Lancashire, where
71 men and only 46 women sign; and as in the West Riding
and South Wales, where there is a difference of 22 between the
sexes.

One interesting question presents itself:—does juvenile mor-
tality diminish, *ceteris paribus*, as the education of the mothers
improves? It seems probable that such should be the case; and
there are known facts which support the opinion. M. Le Play
tells us that in one ill peopled part of Russia, a reward is offered to
parents who bring up six children, and that the reward is seldom
earned. He attributes the great juvenile mortality to ignorant

treatment, such as exposing to the cold the children attacked with measles. In the progress of Sweden as we learn from the excellent paper by Mr. Hendriks (*Statistical Journal*, xxv, 111) far the greatest diminution of mortality has taken place among the very young.

Some facts in my tables point in the same direction. Of 100 women who marry in all England, the marriage register is signed by 64; in London by 81: and this surplus of female education in London is accompanied by a singularly low death-rate of infants. In Surrey (extra metropolitan) the education is as good as in London, and the juvenile deaths are very few. In the other counties near London the same law holds good; since Berkshire, Kent, Essex, Hertfordshire, and Buckinghamshire, are all above the average in female education, and below it in the infantile death-rate. Bucks is the worst of them in both respects. Lancashire supplies a decided confirmation; for that unfortunate county is disgracefully low in female education, and notorious for its high juvenile death-rate.

As usual, there is apparent evidence in the opposite direction. Both the East Riding and the North Riding are remarkable for the general extension of female education: whereas the East Riding has a high juvenile death-rate, and the North Riding a low one. But the force of the comparison is much weakened by finding, when we consult my column 4, that the East Riding has as many towns as Notts or the West Riding, and that in the North Riding the country predominates greatly. It is not pretended that the education of mothers will counteract all evil influences.

I should be glad if I had the means of doing for the towns what I have done for the counties, in comparing female education and infantile death-rates of different places. Unfortunately I do not find in the reports any table of signatures in towns. The smallest county has it: the largest town has it not. This want ought to be supplied.

I cannot suppose that if we had such an account, we should find a uniform combination of high female education and low infantile death-rate. A great demand for the labour of women, will everywhere cause a neglect of maternal duties; and no degree of education will correct this evil. The case of Coventry confirms this obvious truth. The registers completely support the statement that the distress of that town saved the lives of hundreds of infants, by keeping their mothers at home.

Recapitulation of A.

I have now gone all through the columns of my first table, and I have few more remarks to make upon it. I may say that it

strengthens the notion that the worst counties as to mortality whether of adults or of children, are those in which great towns prevail. Formerly perhaps, we might have said in which great manufacturing towns prevail: but we now know that the ill sanitary condition of Lancashire is owing more to its great seaport than even its manufacturing towns. London too, was once thought to be pre-eminent in deaths. We see now that it is far surpassed by one whole county, and all but equalled by another, even taking the true test of male mortality: besides that to compare town with country is an unfairly severe trial for the town.

We learn also, that the sanitary improvements of the country have as yet made little impression on its rate of mortality; and that the diminished death-rates of certain parts have unfortunately, been all but balanced by augmented death-rates in other parts. We see too, that the apparent healthiness of some parishes, set apart for the especial residence of the affluent, is partly owing to the fact that many of the numerous female servants go elsewhere to die; and we conclude that the male death-rate is there the true standard of longevity. We find that some parts are more favourable to adults, some to young children: and what is more extraordinary, that some parts are more favourable to infants and some to children who have survived the first year.

I will explain hereafter the mode in which I have calculated the juvenile death-rate; the ordinary mode of calculation by a comparison of the number living with the number dying being impossible as regards the towns, without further data than those at my command.

II.

TABLE B.

My second table, containing about 30 of the principal towns, has been more difficult, and has cost me more labour, than my Table A, of counties. My difficulty has arisen from the fact that the Registrar-General has treated the towns too much as mere constituent elements of counties, instead of recognizing their substantive existence as aggregates of people placed under very different circumstances, and exhibiting very different sanitary laws, from those found among the rural districts. Though he has given the births, marriages, and deaths, of each parish, he has not given them for the towns, since these are often made up of several parishes and parts of parishes. Besides this, his epitome of results is generally confined to counties; a disregard of towns not so marked in the earlier years of the register (*see* Report IX); though even then the parish in some cases, or the district in other cases, was made to do duty as a town.

Now as I have already pointed out, Liverpool, Manchester, Birmingham, Leeds, and Sheffield, have each a greater population than 11 of the smaller English counties; and there are only 10 of the larger counties which exceed Liverpool. But this comparison is not the most important matter. In the towns, the mortality is greater, the marriages and births are more numerous, the average age of the people is lower, the wages are much higher, the occupations are more sedentary, the minds are more lively. Yet for the fifteen years no epitome has been given of the vast collection of figures relating to them.

More than this; the form of registration is such that it is impossible for anyone outside of Somerset House to get at the results. A few years ago, Mr. Commissioner Hill took some part in a controversy as to the sanitary condition of the borough of which he is recorder: he referred to these reports to ascertain the mortality: he confessed that he found himself baffled. Now in such matters many lawyers are easily baffled: but Mr. Hill, besides being an eminent lawyer, is familiarly acquainted with what we now call social science; and is moreover an arithmetician of unusual excellence. A register unintelligible to him must be quite inaccessible to the public. With reference to the same controversy, two other gentlemen searched the reports; and so entirely with the same result, that they were driven to ask the local registrars to supply the figures they wanted. Of these two inquirers, one was the able editor of a newspaper, the other was a professional accountant in large practice. If the registers are sealed books to such men, what must they be to people generally?

I now proceed to explain, as I did with Table A, each column of figures.

Columns 1 and 2.—My first two columns state the population of the various towns, first as given by the *census*, and then as given by the *Registrar-General*. In noticing the corresponding columns in the table of counties, I pointed out that the Registrar made some counties contain 5 or 10 per cent. more or less than they contain by the census; and that as a consequence, certain border parishes were transplanted into counties to which they did not belong topographically.

But these county irregularities are nothing compared with those now before us. Liverpool with a census-population of 444,000, is reduced by the Registrar to 270,000: Manchester is reduced from 339,000 to 244,000; Birmingham, from 296 to 213; Bristol, from 154 to 66 (less than half); Leeds, from 207 to 118; Sheffield, from 185 to 128; Hull, from 98 to 57.

Other towns are greatly exaggerated: as Bath, from a census-population of 53,000 to a register-population of 68,000: Blackburn

from 63 to 120 (nearly double); Bolton from 70 to 130; Bradford from 106 to 196; Macclesfield from 36 to 62; Oldham from 72 to 111; York from 40 to 60; Wolverhampton from 61 to 127 (more than double). Comparing Bristol and Bradford by the census, Bristol is the larger by one-half; by the register Bradford is three times as large as Bristol.

Chester has no independent existence; it is merely a portion of the district of Great Boughton. On turning to that unknown place, you find that it consists of four sub-districts, of which Chester Castle and Chester Cathedral are two: but by adding together the register-populations of these two, you find that they exceed by one-third that of the city of Chester, which I must therefore pronounce to be absent from the reports.

Leamington again, is wanting, and appears only as a sub-district of Warwick.

Inquirers may certainly demand that Chester and Leamington should appear in the index; and it is highly desirable that all sub-districts should be indexed.

One great evil attends this disregard of the real boundaries of towns:—I mean the weakening of that influence which the register ought to exercise over the municipal authorities. The boundaries of the great provincial boroughs are neither antiquated nor unmeaning: they have been drawn rather recently, and include pretty nearly all those whom business or pleasure has brought together so as in the aggregate to constitute a town. According to the modern habits of the middle classes, few persons except artisans and medical men reside at their places of business: employers generally live in the suburbs and environs of towns. The old parish therefore, contains the poorest and least healthy portions of the population; while the neighbouring parishes contain the more affluent and healthy. But the borough includes both these kinds of population; and is therefore the true town, of which the death-rate ought to be studied and quoted. The register fails to give the means of doing this. If we desire to compare the mortality of Liverpool with that of London, we easily find the deaths of the parish of Liverpool; but for the deaths of the 174,000 persons who constitute the remainder of the borough, we may search in vain. If we want to make such a comparison for Blackburn, Bolton, or Bradford, we find districts called by those names, but each containing nearly twice as many souls as the real towns.

As an illustration of the difficulty of disentangling the necessary figures, I will take the case of Birmingham; a case which my local knowledge, aided by some familiarity with the first volume of the recent census, enables me to explain. The borough consists of the parish of Birmingham, the hamlets of Deritend and of Duddeston.

and the parish of Edgbaston, which latter has been shifted by the registrar into Worcestershire. I propose to calculate the death-rate for the 10 years, 1851-60. To do this, I have to learn first, the average population, and secondly, the average deaths. The first I learn from the census; the second I have to pick out from the register for each portion separately.

The average deaths are a tenth part of the aggregate deaths during the 10 years. These are given for the parish at XXIII, 23, as 51,238. But as Deritend, Duddeston, and Edgbaston, are only sub-districts, I must refer for them to p. 292. It is likely enough that an inquirer, not seeing these sub-districts following the parish and having no instructions elsewhere, may set about, as I did, to collect the deaths from the register of each year. Instructions ought to be furnished, unless it is desired to seal up the register from profane inquirers.

The 10 years' deaths in Deritend, Duddeston, and Edgbaston are found to be respectively, 5,985, 7,190, and 2,070: and adding these to the 51,238 deaths in the parish, we have a total in the borough of 66,483 for the 10 years; and an average of 6,648 for each year.

The census (I, xxi) has supplied me with the population of the borough in 1851 and 1861, and from these figures I infer the average of the 10 years. But to prevent mistake, I compare with this the populations given by the register. Adding together the numbers assigned to the parish, the two hamlets, and the parish of Edgbaston, I find that the total is too large by 2,795. After revising my figures again and again, I comfort myself with pronouncing that a difference of 2,795 in 264,458 is not a formidable one.

Subsequently however, I find an explanation of the difference, but I find it in the census, not in the register. I discover (Census I, 476) that what the register calls Edgbaston, is not the parish but a sub-district with that name attached to it: that it contains the parish indeed, but that it also contains the considerable agricultural parish of Northfield. The population of Northfield is 2,795, the very excess that had perplexed me.

But a correction is now required; because the deaths recorded against Edgbaston, are really the deaths of Northfield as well as of the parish of Edgbaston. Making a proportionate reduction, I conclude that the death-rate of the borough is 25: and this is near enough to the truth, though it involves the assumption that the agricultural parish of Northfield, and the suburban parish of Edgbaston, are equally healthy.

But if in this instance, with my local knowledge, and by turning, with that for my guide, backwards and forwards to the register and the census, I arrive at last only at a near approximation to the

h; any attempt to understand the mortality of other boroughs must be hopeless. I find, *e.g.*, by the census (I, 59), that the borough of Liverpool consists of the parish of Liverpool, part of the parish of Toxteth Park, part of the parish of West Derby, and the townships of Everton and Kirkdale. Turning to the register, I see nothing of Kirkdale, and I find the mortality for the whole of Toxteth Park, with no note of what part of it belongs to the borough.

I confess that as regards Blackburn, Bolton, and Bradford, where the population given by the register is nearly twice as great as that given by the census, I have not made an attempt to calculate the death-rate of the boroughs. But I must remark that the places set down under these names, instead of being towns, are districts each with a town for a centre. When therefore, we are led to believe that the death-rate of two of these places is 26, and of the other 27, we are greatly misled, because such a statement implies that it is the towns which are intended.

It is equally untrue that the death-rate of Liverpool is 33, that of Manchester $31\frac{1}{2}$, that of Birmingham $26\frac{1}{2}$: these are the death-rates of the worst parts of these boroughs; and the mistake is peculiarly great as to Liverpool, because the population given by the register is unusually below that of the census.

This is the most serious deficiency I have to point out. The town councils of boroughs are responsible to the country for the adoption of sanitary measures within their boundaries. The first information they need is the comparative death-rates of their own and of other boroughs. If they require their town clerk, or their inspector of health, to consult the reports, they learn as the result that boroughs are unknown to the Registrar-General: that in one case a parish, containing probably the greater part of the borough, in another case a district twice as large as the borough, stands under the name of the borough itself. Though I have shown how the death-rate of one borough may be culled from the figures given, I have before given proof that men of unusual competency, with their faculties whetted by controversy, have failed to discover the mode of doing this. The remedy I will suggest elsewhere.

Column 3.—In my next column I state the number of acres there are, not as in the counties to each person, but to every 100 persons. This does not conclusively determine whether or not the people are crowded; because many towns have extensive areas not built on; others have vast docks and blocks of warehouses; Liverpool and London have a considerable expanse of water included in their acreage; and the areas given for places like Blackburn, Bolton, and Bradford, are those of districts and prove nothing as to the towns. A large nominal area therefore, may co-exist with crowding:

but a confined area, like that of Liverpool, further narrowed by warehouses, does definitively prove over-crowding. It appears that the densest populations, judged by this imperfect standard, are those of the parish of Liverpool with three-fourths of an acre of land and water to every 100 persons; of the parish of Birmingham with $1\frac{1}{4}$ acres of land; of the parish of Leeds with $1\frac{3}{4}$ acres; of Nottingham and Plymouth with $2\frac{1}{2}$ acres; of London and of the parish of Bristol with $2\frac{3}{4}$ acres; of Brighton with 3 acres. This order is in accordance with that of the death-rates: for though Liverpool is at the top of both lists, Manchester, which is a particularly unhealthy place, has 5 acres to every 100 persons, an area four times as great as that of Birmingham, the healthiest of the great towns.

Column 4—gives the increase of population as furnished by the register: information of little value, because the partial limits fixed on reduce the high decennial increase of Liverpool to 4 per cent., and that of Manchester to 7 per cent.; while Bristol is represented as being about stationary.

Column 5—consists of the number of persons in a house. London is well known as having a high number: but this is not entirely owing to the crowding of families into a part of the large old houses, and to the absence of detached cottages; it is also partly caused by the great number of domestic servants in London, just as in Bath, Brighton, and Cheltenham. Plymouth has, of all these towns, the highest number in a house:—viz., more than 10; against $5\frac{1}{3}$ in all England, and against nearly 8 in London. Gateshead, Newcastle-on-Tyne, and Sunderland, have about the same as London, and the parish of Liverpool has not much less. The manufacturing towns generally, do not much exceed all England.

Columns 6 and 7.—We now come to the death-rates of the towns, and I have given first, those for the ten years 1841-50, and then those for the ten years 1851-60. Comparing these two decennial periods, I find some examples of marked improvement. This is notably the case with several of the largest and most unhealthy places. The parish of Liverpool improved from 39 to 33; but so much of the frightful 39 was owing to the famine-stricken Irish driven across the straits to die, to say nothing of exceptional cholera (as in the case of Hull), that I cannot pronounce what has been the real amendment caused by the closing of cellars and by other sanitary measures. Hull improved from 31 to 25; but the cholera-pestilence was chargeable with much of the excess of the former period.

Coventry improved by more than 2; Bath, Portsmouth, Leeds, and Bristol by nearly 2; Salford and Manchester by about $1\frac{1}{2}$; Leicester, Chester, and Plymouth by about $1\frac{1}{4}$; Macclesfield and Cheltenham by more than 1; London by less than 1.

Many places however, deteriorated: as Preston by fully 2 in the 10; Sheffield and Southampton by less than 2; Yarmouth and Ryehead by less than $1\frac{1}{2}$; Blackburn, Nottingham, and Norwich, more than 1; Bradford and Brighton by less than 1.

I must notice here an inaccurate statement publicly made as to supposed improvement connected with an outlay on drainage. A gentleman of authority in Bradford, in a paper ("Social Science Transactions, 1862," liv), correcting some unfortunate mistakes made three years before, stated that in Leeds, after the execution of main sewerage, the death-rate fell from nearly 34 to 28. Now I find that the Leeds death-rate from 1841-50 was only $29\frac{1}{2}$ instead of 34, and that the reduction to 28 was a fall of less than 2 instead of 6.

Columns 8 and 9.—I now come to two columns, one containing the male death-rate, the other the excess of females living over males dying. I have made some remarks on these topics, in my explanation of column 9 in Table A. I have noticed that in certain parishes containing an unusual number of affluent families, the proportion of the sexes is greatly disturbed by the aggregation of female servants; who are generally persons of favourable ages, and of more than average health; and who often return to their homes elsewhere to die. I mentioned several places, of which the most remarkable was Clifton; where at the last census the females of all ages exceeded the males of all ages by 73 per cent. I inferred that the male death-rate was more worthy of attention than the female. In my present Table B, I find that in all England the deaths in 10,000 males exceed the deaths in 10,000 males and females by 8: that in London the male excess is 19; in Clifton 36; in Leamington 31; in Southampton, Brighton, and Bristol 30; in Bath 27; in Edgbaston 24; in Yarmouth and Nottingham 23; in Manchester parish 22; in Liverpool parish 19; in Cheltenham and Leicester 18; in Bolton district and Leeds parish 17; in Birmingham parish and Coventry 16. It will be seen that it is not in manufacturing towns, but in parts of the affluent, that the male death-rate is most in excess. Of manufacturing towns Nottingham is the highest, and Manchester the next; both these, and only these, being above London.

It is not pretended that all the excess of females over males consists of domestic servants. Throughout the kingdom there is an average excess of 5 per cent. Then in places like Bath and Clifton, the number of ladies much exceeds that of gentlemen. Thirdly, it is only a part of the domestic servants who return to their native places to die. The excess therefore, of male over female deaths in certain parishes, is not so great as the excess of females living over males living.

Columns 10, 11, and 12.—The next matter I have to enter upon is

the death-rate of young children in towns. In explaining the corresponding columns of my table of counties, I mentioned that social reformers have indulged in exaggerations on the subject, going so far as to say that in many towns half the children born die before attaining their fifth year; and that more than a fourth die in their first year. I believe these errors have arisen from a false mode of calculating the death-rate.

I also deferred the explanation of my mode of calculation, and this I will now give. Two modes are possible. By the first, we ascertain the number of children living each year, and the number who die each year. A town that had 1,000 infants during the year exposed to the risk of death, and in which 150 infants died, would have an infantile death-rate of 150. This mode, to be accurate, would require an annual census. But we have to content ourselves with taking the mean of two decennial censuses.

For ordinary purposes this calculation is accurate enough, but it is not so for minute comparisons. It might happen that the year before the census, the deaths of infants were unusually numerous or unusually few; and in fact, the census of 1851 must have been sensibly affected by the low mortality of the year before, and by the consequently abnormal number of young children living. Again the rate of marriages fluctuates a good deal, according to the prosperous or adverse circumstances of the country: and if an unusually large number of marriages took place immediately after one census, say in 1852, and during a year or two afterwards, there would be an unusually large number of births during the first half of the decennial period; and if from 1855 to 1860 the marriages fell to their average rate, or below it, the young children living at the census of 1861, would be moderate: the augmented births of the first half of the decennial period appearing in the unusual number of children over 5 years old. The mean of the two censuses may therefore be far from accurately expressing the number of young children that have been exposed to the risk of death during the 10 years.

That these two causes, an irregularity in the death rate and an irregularity in the birth-rate, or that some other causes which have escaped me, do produce a sensible effect, is proved by the last census. In vol. ii, p. x, we find the numbers of the population at each age; and we see that of every 1,000 children under 5 years old, the number in the first year of life was 220; in the 2nd year 201; in the 3rd year 198; in the 4th year 191; in the 5th year 190: giving decrements of 19, 3, 7, and 1; decrements far indeed from those which would follow on the average from the ascertained laws of uniform births and deaths.

But since there is so much irregularity in the whole country,

re an excess in one corner is corrected by a default in another, might safely assume that the various divisions would exhibit still uniformity. I have not diligently sought for examples: but I find that in Bedfordshire in 1855, the deaths of infants were 463, in the next year, only 384; a difference of 79 or 17 per cent.: that in the same two years, the deaths of children over 1 and under 5 were 162 and 201 respectively; a difference of 162, or 44 per cent. How different would a census have looked as to the young children of Bedfordshire, if taken in 1855 or in 1856!

A similar instance, but in a town, is that of Nottingham; where the deaths of all under 5 were 584 in 1859, and only 372 the next year; a difference of 212, or 36 per cent.: and this irregularity, occurring just before the last census, would vitiate the enumeration as to that town. What happened in Nottingham, may have happened in a score of other towns and parishes.

It appears then that the authoritative mode of calculating the infantile death-rates is far from perfect, in the absence of an annual census. This diminishes my regret that it is impossible to apply that mode to towns, without further data than we possess. The impossibility is caused by a want of harmony between the register and the census: the one giving the deaths in the *parishes*, the other giving the ages in the *boroughs*; and parishes being, in the absence of further information, incommensurable with boroughs. I know how many children there were in the borough of Liverpool at the last census: I do not know how many children died in the borough of Liverpool from 1851 to 1860.

It follows that another mode of calculation is necessary to ascertain the children's death-rate: this mode is to compare the deaths with the births. In places where the births and deaths were accurately registered, and no migration went on, this mode would be perfect, and therefore preferable to the one founded on the census. As however, the registration is imperfect, and as young families are sometimes carried from one place to another, the results will be only an approximation to the truth, after every possible correction. This mode however, has one obvious advantage over the other, that it is not disturbed by the variations of births and deaths from year to year: it takes all the registered births and deaths during ten years, and it matters not whether these predominated in the beginning, the middle, or the end of the decennial period. Probably, for particular places, though not for the aggregate of the country, this birth-mode is more accurate than the decennial-census-mode.

At the head of columns 10 and 12, in the line for all England and Wales, I give the death-rate of male infants under 1, as $\frac{1.61}{1000}$: of male infants under 5 as $\frac{2.66}{1000}$. In the English life table (Registrar-General, XII, Appendix, 73) it is stated that of 513 male

infants under 1, 82 die the first year and 142 the first five years making the death-rates respectively $\frac{160}{1000}$ and $\frac{277}{1000}$ against my $\frac{266}{1000}$; a difference of 1 in the one case and 11 in the other series of years however, not being the same in the two cases.

In the later reports, the epitome of results confounds all the 5 years of life, a classification I regret. Besides this, the epitome is ambiguous, and to a casual observer quite unintelligible. If we turn to Report XX, xix, we find that in the 10 years 1847 the deaths of male children under 5 were $\frac{73}{1000}$. An inquirer, comparing this 73 with the 277 deduced from the Registrar's table, is sorely perplexed. He supposes that the 73 is the average of 5 years of life, and that five times 73, or 365, represent aggregate deaths; but 365 so much exceeds 277 that the conjecture is dismissed, and the volume is closed.

It is much to be regretted that the register should contain a table so hard to comprehend, and so liable to be misunderstood. I attribute partly to this ambiguous table, and to the reiterated statements of similar results in other parts of the reports, the gross exaggerations of sanitary reformers as to the deaths of young children. It was the duty of the Registrar-General, as I think, to explain the true import of this table, and to guard inquirers against the probable misinterpretation of it. But the language used in the register itself, confirmed the popular misapprehension, and even left it open to doubt, whether the Registrar-General himself did not share it. Thus, at XX, xx, under the head of "Ages," we see the words, "The mortality of males under 5 years of age was at the rate of 73 in 1,000:" which I believe would be generally interpreted to mean that out of 1,000 children born, 73 die in each of the first 5 years, or 365 in all the first 5 years. Again at the foot of the table itself, there is the remark, "Of 100 males living at the age of 35 and under 45," so many died: meaning that to 100 males *remaining alive* at the end of the year, so many died. The same equivocal notion in another form is to be found in an earlier report (IV, 17) where there are instructions how to calculate the death-rate; and where the number left alive is confounded with the number exposed to the risk of death. I trust that in future reports the Registrar-General will put inquirers on their guard against this ambiguity.

I have mentioned that in calculating the children's death-rate a correction was required for the imperfection of the registers. Few bodies, even of the youngest infants, are buried without some public rites: registration follows of course. But many parents, through carelessness or procrastination, omit to register births. I conjectured formerly that this would happen especially in the case of illegitimate births; but two competent district registrars have

ured me that, on the contrary, mothers anxiously register putative fathers, under the fallacious notion that they thus secure evidence of paternity. It is certain however, that the register of births is imperfect: a fact proved by comparing the registers with the census; the excess of births over deaths, the emigration and the immigration, with the decennial augmentation of numbers. We can only conjecture what is the proportion of omissions: but as I am unwilling to understate the children's death-rate, and as the larger number of births the lower must be the death-rate, I have assumed that the omissions are at the moderate rate of $\frac{1}{40}$. I have made a deduction therefore, of $\frac{1}{40}$ th, from all the figures in columns 10, 11, and 12, in Tables A and B, and of the corresponding columns in Table C.*

I may add that to save time, I took the births as well as the deaths of the 10 years 1851-60; though the infants that died in 1851 must, some of them, have been born in 1850; and though the children over 1 and under 5 must, all of them, have been born before 1851. In an increasing population, the births I have taken would be too numerous, and the death-rate therefore too low. I have consequently consulted my column that marks the rate of increase; and in each place for every 10 per cent. of increase, I have added to my juvenile death-rates, one-third per cent. in the case of infants, and 1 per cent. in the case of all children under 5. The death-rate of children over 1 and under 5 is found by subtracting one of these from the other:—column 10 from column 12.

After all the care I have taken, I know that my figures cannot be regarded as accurate; but I do hope they are sufficiently near the truth to indicate the comparative mortality of different places: and even if my juvenile death-rates should prove to be $2\frac{1}{2}$ or 5 per cent. too high or too low, such a divergence would not invalidate my principal inference that the juvenile death-rates have been grossly over-stated by sanitary reformers.

Column 10; results.—I will now mention some comparative results. As to male infants under 1, the highest death-rate is that of Liverpool parish:—240: against 161 of all England and of London. The next highest are Coventry 224; Nottingham 223; Manchester parish 220; Leicester and Preston 212; Norwich 208; Leeds parish and Oldham district 206; Blackburn district and Bradford district 205; Stockport district 204; Wolverhampton

* Since I read this paper, the third volume of the Census has appeared; we learn from it (p. 6) that the excess of unregistered births over unregistered deaths is about 5 per cent. of the births. My argument as to infantile deaths, is still the stronger. I have altered my tables in the appendix by deducting a second one-fortieth from the figures in columns 10, 11, 12, and by calculating column 13 afresh.

district 203; Yarmouth 202; Hull parish 201; Sheffield parish Bolton district 194; Birmingham parish 189. The favourable are those of Portsmouth 147; Cheltenham and Chester district London and Bath (as all England) 161; Derby 172; Brighton Gateshead 174; Plymouth 175.

Columns 11 and 14.—Column 11 gives the death-rate of children over 1 and under 5. The most singular fact it reveals, is the large number of such deaths in London, when compared with the moderate mortality of infants: a fact I have already noticed. Whereas the London death-rate of infants under 1 is the same as that of all England, the London death-rate of children over 1 and under 5 is higher than that of all England by 30 per cent.: it is 137 to 105.

Why should London infants be healthy, and London children of past infancy be very unhealthy? Is it the impurity of the air? Surely that would injure infants more than others. It cannot be the want of domestic care, or of medical attendance; for if so, why should the infants escape? I conjecture that it is the want of space and the consequent confinement of the children to the house or room in which they live: a circumstance not so injurious to infants when comparing them with infants of the same class in society elsewhere because as they cannot run about, they are everywhere confined to the same room as their mothers.

If indeed, we satisfied ourselves with glancing at the density of the populations, as exhibited in my column 3, we should dismiss this opinion: since London appears there as having twice the space per head that Birmingham has; and three times the space that Liverpool has. But we know that Liverpool and Birmingham in the register, are the town parishes with all the suburbs cut off; while London includes Chelsea, Hampstead, Woolwich, and Sydenham. To make a fair comparison we must go to my Table C, of the different London districts; and then we shall see that Marylebone, the Strand, Whitechapel, the City, and other districts, are at least as much crowded as the parish of Liverpool. Besides this, the streets of these parts of London being narrow, are so filled with horse and foot passengers, that children are almost excluded from them.

Now of late years, nothing has been more clearly proved and more strongly brought into relief, than the necessity of open-air exercise, and the fatal effects of living under cover. Scavengers, we are told, are a healthy race: and the only explanation offered is, that the impurities they inhale are more than neutralized by the open air in which the men work.* The successful treatment of the insane,

* I am aware of the statement that the effluvia from animal ordure, even when fermenting, are generally innocuous.

akes out-door exercise as its basis. Mr. Neison, in his vital statistics, infers from his study of friendly societies, that the superiority of health in rural populations is not caused so much by greater purity of air as by labouring in the open air: since small shopkeepers and other sedentary persons in the country, have no great vital superiority over the same classes in towns; whereas the farm labourers who work out of doors attain, notwithstanding wet and rheumatism, much greater longevity than mechanics who work behind glass windows.

It is no wonder then, that London children, cooped up in part of a house, set maternal care and medical attention at defiance, and die by thousands. Persons who have lived in the great provincial towns, and have driven or ridden through the streets, are familiar with the annoyance caused by the swarms of children who turn the thoroughfares into playgrounds. Occasionally, a poor child is killed or maimed for life: but for one child thus cut off, a hundred probably, have their constitutions strengthened, and their lives saved from disease.

An inference too, may be drawn in favour of the practice of having a separate house for every family, as distinguished from model houses with a family occupying each story. The young children living on the flats above the ground floor, cannot be constantly running out of doors. Model houses, furnished with every other convenience, still lack the playground.

In some towns, the cheap houses are seldom built fronting the street: they are placed in yards and courts. These often look confined, sunless, and dismal; but they have this advantage, that they are safe playgrounds.

While I was writing this paper, there arose a painful discussion as to the sanitary condition of the children of Bethnal Green: and grave allegations were made as to diseases prevailing. As far as I know, no one thought of appealing to the Registrar-General about the juvenile death-rate: a proof I think, that the experience of a quarter of a century has failed to establish Somerset House as the ultimate authority in questions of mortality.

The last line of my Table C gives many particulars of Bethnal Green. We find that the population is dense, but not so dense as in many other parts of London: that the increase of population from 1851-61, and the number of persons in a house, were rather lower than those of all London: that the general death-rate from 1851-60 was considerably lower than that of all London; and that the male death-rate (the true test) was lower than that of all London. Bethnal Green appears to have very few female servants; for its whole excess of females over males is only $3\frac{1}{2}$ per cent., against 5 per cent. in all England and nearly 15 per cent. in all

London. But notwithstanding this, the number of persons in a house is large. Considering therefore the class who live there, and the considerable density of population, the death-rate is rather remarkably low.

The outcry however, was principally about the condition of the children. The leading fact was, that many of the children, failing other play places, ran among the pigstyes and contracted a loathsome skin disease. Consulting my columns 11, 12, and 13, of Table C I find that the death-rate of infants under 1 year is singularly low being 5 under that of all England and of all London; while that of Liverpool parish is higher by one-half (240 against 156). But under 1 year old, children cannot run among the pigs. When I come to the ages over 1 and under 5, the evidence of the figure confirms the medical testimony; for the death-rate, instead of being low as in the case of infants, is no less than $\frac{139}{1000}$, which is actually one-third higher than that of all England, though scarcely higher than that of all London, and less by a-third than that of Liverpool parish.

Healthy infancy, and sickly childhood: this combination surely cannot mean impure air or maternal and medical negligence: it must mean want of space for the open-air sports of children. The great sanitary want of London, as it seems, is not better drainage, or burning of smoke, or better houses, so much as juvenile playgrounds within reach of every house. London does not want the *Crèche* of Paris, which in manufacturing towns, or in Liverpool, might save thousands of infants: it wants a Lisbon earthquake, or a Stuart fire, to give the opportunity of re-construction and extension. It does not want close infant schools, but children's open-air play-places.

But do these columns give similar results in other places? They certainly do in the case of the City of London. Its general death-rate judged by column 8, which includes a fair proportion of deaths in public institutions, is lower than that of all London: its infant death-rate is apparently low, though many infants may be sent elsewhere to die: its children's death-rate (over 1 and under 5) is higher even than that of Bethnal Green, besides the children that may die elsewhere; it is therefore, higher by more than a-third than that of all England. One comparison here is a striking one. In all England, more children by one-half die in the first year than in the four following years together: in the city, more children die in these four years together than in the first year. The column 2, of density of population, appears inconsistent with these results; for the area of the city is greater per head of population, than the area of Bethnal Green; in the proportion of 95 to 72. But besides the space taken up with public buildings, warehouses, and crowded streets, there is

a large deduction to be made for the area of the part of the Thames included within the city boundaries.

Going to other towns, we find that Liverpool parish even exceeds London in its *proportion* of children's mortality to infantile mortality, while its *absolute* juvenile death-rate is far higher. The deaths of infants (under 1 year) out of 1,000 births, are in London 161, in Liverpool 240, or one-half more: the deaths of children (over 1 and under 5) out of 1,000 births, are in London 137, in Liverpool 227, or considerably above one-half more. The proportion of children's deaths to infantile deaths, is in London 85 per cent., in Liverpool 95 per cent.; being for all England only 65 per cent. It may seem unfair to compare the parish of Liverpool, with the whole of London; but if the comparison is made with either the City of London or with Bethnal Green, matters are not much mended. Then comes the question whether this prodigious death-rate of children in Liverpool parish is accompanied by great crowding of the people. I answer that it is so. The area per head in the parish of Liverpool is about one-third of that of London: it appears better than that of Bethnal Green, but the water included in the case of Liverpool makes its land area less than that of Bethnal Green, by about one-fifth (*viz.* as 58 to 72).

Birmingham parish at first sight points the other way. The density of its population is high, as compared with that of other large towns; though it is less than half that of Liverpool, water being allowed for; nor is it anything near that of the London districts. It is undeniable also, that nearly every family has a separate house; and that the courts and streets furnish plenty of playground for the children. The death-rate of infants is higher than that of Bethnal Green by one-fifth; the death-rate of children (over 1 and under 5) is about the same as that of Bethnal Green: the Birmingham ratio therefore, is much lower, and neither contravenes the law, nor strongly supports it.

In Table B, column 14, I give for each town, the ratio of children's death-rate to infantile death-rate. After Liverpool come Plymouth and Portsmouth, each with a high ratio, though the density of the population is not great, even allowing for the water included in the area. Plymouth and Portsmouth therefore, do contravene the law. It is remarkable that both these are, like Liverpool, seaports.

If the law exists, the ample spaces for playgrounds in rural districts, ought to reduce the ratio far below that of towns. My Table A, of counties, is not one of rural districts only, but takes the counties including the town populations. The ratio in question therefore, ought to be lower than that of towns, but not so much lower as if the rural districts only were given.

I find then, that for every 100 infantile deaths, there are in the three worst counties 75 children's deaths: but thirteen towns have a ratio as high or higher; and instead of merely 75, Liverpool has 95, Plymouth and Portsmouth have 87, and London has 85. Again, three counties have a ratio as low as 44, while the best town on my list has 51. These facts are quite consistent with the supposed law.

Recapitulation of B.

I will now sum up the results of my remarks on Table B, of towns. Comparing the two decennial periods of 1841-50 and 1851-60, there has been a marked decrease in the death-rate of several towns: especially of Hull, which fell from 31 to 25; and of Liverpool, which fell from 39 to 33; making a decrease of 6 in each case. But in both these towns, the high mortality of the earlier period was exceptional; having been caused by frightful visitations of cholera, aggravated in Liverpool by the Irish famine and the consequent Irish immigration of dying persons. Manchester also, has a diminution of $1\frac{1}{2}$ in the 1,000, and London of less than 1: perhaps these two improvements may be permanent. In Birmingham the death-rate was a shade higher in the latter period; though a large sum had been spent in drainage, and many nuisances had been removed. As no cholera was ever known there, the comparison of the two periods is a more satisfactory one than that of London and of Manchester, and still more than that of Hull and of Liverpool. Bradford district was worse during the second period, notwithstanding great efforts at improvement. Some other towns exhibited a slight deterioration, many others a slight improvement.

On the whole it appears that the large outlay on drainage and purification, has done nothing like what it gave promise of twenty years ago. I am therefore, brought to think that causes other than an impure atmosphere, must be assigned for the painfully high death-rate found in great towns. In the case of the men, and partly of the women, one cause is the working under cover instead of in the open air: another doubtless, is the expenditure of high wages in coarse pleasures, unchecked by a knowledge of the laws of health. In many towns the undue employment of mothers causes the deaths of many infants: in all, but especially in London and Liverpool, the want of open-air amusements is answerable for the deaths of many children who had survived infancy. Unfortunately, these mischiefs are incapable of speedy correction. Ten years, and so many millions of outlay, would reform the whole drainage of the kingdom: but a generation will not do much to alter the habits of the nation; and a

century will not, as far as we know, banish glass windows from workshops, and turn cotton-spinning into the open air.

I have contended that for the purpose of comparison, the male mortality is the most important. The adoption of this, and of several other necessary corrections, would modify materially some of the Registrar-General's conclusions.

Of the very large towns, Birmingham stands next to London in *recorded* healthiness: the two having death-rates of 24 and 26½ respectively. The necessary corrections, I believe, show that Birmingham is the healthier of the two. The difference in the male death-rates is 2·35; but this is for Birmingham parish, compared with the whole of London, including Hampstead and Sydenham. The difference in the male death-rates of London and the borough of Birmingham is less than 1 (·71). Again, London has a far larger proportion of affluent and educated persons than any manufacturing town has. Column 9 of B shows that London has probably three times as many domestic female servants, and therefore at any rate twice as many affluent families. Now by taking in the suburban parts of the borough of Birmingham the death-rate is reduced by more than 1½; by doubling these affluent and educated parts, the death-rate would be reduced a second time by 1½; at once turning the scale against London. Nor is this all. We ought to compare not only class with class, but also age with age. An infant asylum however healthy, will have twenty times as many deaths as a public school of equal numbers. A fast increasing town faintly resembles an infant asylum; London, which increases less fast, faintly resembles a public school. On this principle, according to my calculations of specific mortality eight years ago, a reduction of $\frac{1}{1000}$ should be made in the death-rate of Birmingham as compared with that of London.

The comparison will then stand thus:—

	London.	Birmingham.
Recorded mortality	24	26½
„ of males	25·70	28·05
„ „ in the borough	—	26·41
<i>Deduct—</i>		
1. On supposition that Birmingham had } 1·64	}	2·64
as many affluent families as London }		
2. For excess of juvenile population	1·00	
	25·70	23·77

This account, if it be correct, shows that whereas according to the register, Birmingham has a death-rate higher than that of London by 2½, it has really a lower death-rate by 2. An alleged

difference of $4\frac{1}{2}$ in the 1,000, say one-sixth of the whole, is startling enough, but I believe my statements to be correct.

As to juvenile mortality I need scarcely recapitulate what I have said. I have given my reasons for believing that there has been great exaggeration as to the deaths of children in towns; and I have attributed this error in part to the fallacious mode of stating the death-rate from those left alive instead of from all those exposed to the risk of death. I have also given the reasons for my conjecture that it is not impurity of town air so much as want of open air that multiplies the deaths of children.

III.

TABLE C.

There is a striking paper on the subject of mortality, in the "Social Science Transactions for 1860," pp. 632—648. It was written by Dr. Gairdner, an eminent Edinburgh physician; and he arrives at these startling conclusions:—First, that in unhealthy places, not only do infants die faster than in healthy places, just as adults do; but that unhealthy places are more fatal to infants than to adults; (*see* pp. 633—635 and 644): Secondly, that agricultural counties, and particularly the great corn-growing counties, are fatal to infants (pp. 640, 644): Thirdly, that the west-end of London has an unduly high death-rate of infants under 1 year (p. 648). My three tables will enable me I believe, to dispose very shortly of these three propositions.

I. The first is, that as a place increases in mortality, children suffer more than adults. Now the most unhealthy considerable place in England is Liverpool: its male death-rate is $\frac{3.5.23}{1000}$; something *more* than 50 per cent. worse than that of all England: its male infant death-rate is $\frac{2.46}{1000}$; something *less* than 50 per cent. worse than that of all England: in Liverpool therefore, infants suffer less, and not more, than adults. If the proposition had referred to children over 1 and under 5, Liverpool would, as far as it goes, have been on Dr. Gairdner's side.

But to fully investigate the question, I will refer to column 13 of my two first tables, A and B; and we shall there find the proportion between the male infant death-rate, and the male general death-rate, for every county and principal town: my figures, it will be found, contravene Dr. Gairdner's opinion. For in Table A, the highest proportion of infant death-rate is in Bedfordshire, Cambridgeshire, Lincolnshire, and Northamptonshire; and in none of these is the general death-rate high: in Table B far the highest proportion is in Coventry; then come Norwich, Oldham, and Leicester; but in all four places the general death-rate is decidedly under that of Liverpool, Manchester, Leeds, and Sheffield. I have selected these

cases; but a further inspection of my columns will justify my disbelief in Dr. Gairdner's statement.

II. The second proposition is, that agricultural counties generally, and corn-growing counties especially, have a high infant death-rate: and this, not merely in comparison with the general death-rate of the same counties, but in comparison with the infant death-rate of other counties. The counties in which the agricultural population predominates over the town population, can be readily found by my column 4 of Table A: the most remarkable are North Wales, South Wales (each regarded as one county), Westmoreland, Essex, Herefordshire, Huntingdonshire, Rutlandshire. In these, with one exception, the infant death-rate is either low or very low. The exception is Huntingdonshire, which as we are told, has many persons engaged at home in manufactures, and which therefore, is not really agricultural, but resembles those counties in which towns prevail. Dorsetshire and Somersetshire, also, have a prevalence of agriculture and a low infant death-rate. I conclude that the second proposition, as far as agricultural counties are concerned, is unfounded.

As to the corn-growing counties the case is not so clear, though I have no means of determining exactly which counties come under this denomination. If Lincolnshire, Norfolk, Suffolk, and Cambridgeshire are fixed on, it is true that these except Suffolk have a high infant death-rate, as compared with that of the other agricultural counties I have mentioned. But then they are situated on the eastern side of the island, and have generally a marshy character. It is open to great doubt whether corn-growing has anything to answer for. The probability that climate is a predominating cause is strengthened by the fact, that a low infant death-rate prevails in the five south-western counties, Devon, Somerset, Wilts, Cornwall, and Dorset, to say nothing of the southern Hants. I conclude as to this second of Dr. Gairdner's propositions, that half is untrue and the other half unproved.

III. The third proposition is more startling than the other two: it is (pp. 646—648) that the west-end of London is fatal to infants; fatal both absolutely in the number of deaths, and comparatively with the adult deaths in the same locality. My reply is that Dr. Gairdner's table and mine are quite at variance. We agree pretty nearly, considering that we take a different period, as to Hampstead and Lewisham; but as to St. George's Hanover Square, Marylebone, and other districts, there is a difference of a-fourth or a-fifth; a difference so considerable, that if it had occurred in all the districts, it would have led me to believe that this infant death-rate had been calculated from those left alive instead of from those exposed to the risk of death. Dr. Gairdner's special warning is founded on the

case of St. George's Hanover Square, a district that consists of "Hanover Square, May Fair, and Belgrave." Any close examination of the statement is unsatisfactory: partly because though written in 1860, it is founded on the mortality so far back as 1838-44, the latest period of any detailed calculations by the Registrar-General: partly because the general mortality of the district, fell in the last decennial period from 24 to 21: lastly because the distribution of hospitals and workhouses over the metropolis, makes minute comparison impossible. All I can say is that my figures, as they stand, make the male infant death-rate for St. George's Hanover Square, very low; for a town district singularly low; lower by 9 per cent. than that for all England; lower by nearly two-fifths than that of Liverpool; lower than that of any town in my list B except Portsmouth. If indeed, Dr. Gairdner had extended his inquiry to the case of children over 1 and under 5, he would have found that this west-end district has the fatal peculiarity I have discovered in the City and in Bethnal Green, though not in the same degree. It is not against infants, but against young children past infancy, that Hanover Square sins; but the evil is less than that of the other London districts I give, with the exception of Lewisham and Hampstead, which belong to the country rather than the town.

But if the case were worse than it is as regards children past infancy, the inference would be quite different from that to be drawn from a high infant death-rate. In this latter case one might attribute the mischief to the custom of employing wet nurses, and generally to maternal neglect; but as to children past infancy, it seems more probable that the want is rather of gardens and playgrounds in which the children might live out of doors as they would in the country; a want only partially relieved by a morning and afternoon run in the parks.

I have mentioned the complication caused in the London districts, by the irregular distribution of workhouses and hospitals. West London is an extreme case. The general death-rate appears to be $\frac{45}{1000}$: it is really only 24, as appears from column 8. The explanation is that it has St. Bartholomew's Hospital within its boundaries, and that the deaths there, added to those in the workhouse, are more than half the deaths of the district. I do not mention this obvious correction as any new discovery. The register furnishes the number of deaths in these institutions; I wish it also distinguished the sexes and ages; as for want of this classification I have been unable to correct my Table C so as to make it of much value.

As regards Dr. Gairdner's statements therefore, I conclude that they are unfounded. It turns out that, if my tables are correct, unhealthy places are not more fatal to infants than to adults: that

the infant death-rate is not high in agricultural counties: that it is not high at the west-end of London. It does seem that that rate is high in some corn-growing counties, but it seems as probable that this is caused by damp and bleak situation as that it is caused by maternal neglect.

Changes Wanted in the Register.

In the course of my remarks, I have pointed out what seem to me defects in the Registrar-General's reports, as well as certain additions which I regard as desirable. I will briefly recapitulate these.

First, the register should be so complete in itself, as to enable any competent person to calculate the death-rates for any parish, town, or borough, and for either sex, without referring to the census. It should also be so arranged as to give every possible facility to casual inquirers; and for this end there should be prefixed notices and instructions, with examples. The form of the register is generally excellent; but it would be advantageous if in all parts a space were left after every five lines of figures. The table given several times, and for example, at XX, xix, requires explanation; readers should be told what it does and what it does not indicate. The first year of life too, should be given separately.

Most of the other changes have reference to towns; but in the counties there is one much wanted: I mean where a border place is carried out of its own county: notice of such an irregularity should be given at the head of each county; the preliminary instructions should mention that such changes in topography occur: and the general index should be extended to sub-districts.

I have shown that the information about towns is very defective: that in the greatest towns the parish stands for the borough, although it may contain less than half the population, as in Bristol; and although such a statement may much exaggerate the death-rate, as in Liverpool from 1841-50. The remedy is not obvious. It is undesirable to increase the difficulties of reference and comparison by disturbing the present form and uniform paging of the register. Probably the best way would be to add to the decennial volume which follows the census, full particulars of every *borough*, with numbers of births, marriages, and deaths, and the rates per 1,000 of each of these.

The index wants large additions. Many towns, Chester and Leamington, *e.g.*, do not appear in it, because they happen not to be separate districts. Every sub-district should be given.

There is another signal deficiency. The report supplies us each

year with the proportion of men and of women who sign the marriage register; but this is given only for each county and for London. This important information as to the state of education in the towns is entirely withheld from us.

In the London register notice is given in each district of the number of persons that die in hospital, workhouse, &c. In "Wes" "London" half the deaths are thus accounted for. The same should be done for other towns, that each sub-district may be judged of fairly. Notice should also be given of every case in which any public institution is situated outside a borough; and the number of extruded deaths should be stated, with sex and age.

In London, this notice, H, W, &c., should be repeated in every page where the number of deaths is given. And what is of greater importance, the sexes and ages should be given at pp. 83, 84.

Decennial Volume.

But of all improvements the greatest would be the compilation of a good epitome of results once in 10 years, after the census has been taken.* The present epitome is feeble and lame. An elaborate series of tables was given in 1846, of results for the years 1838-44; *i.e.* for seven years taking the census year 1841 as the pivot. Since that time the Registrar-General's statistical zeal has cooled, and the calculation of results has been left to the irregular efforts of individuals, who are quite unable to accomplish it fully. After the lapse of 18 years it is time that a new official effort should be made.

No doubt, in the decennial epitome, as for example in Vol. XXIII, there is a summary of the registers of the 10 years, but it is a mere summary, unaccompanied with any results. We have the marriages for each of the 10 years, and for all together: we have the population for 1851 and for 1861; from these data any competent person may calculate the marriage-rate. But in my opinion the rate should be added; for each county, each borough or town, each district and sub-district. This column of percentages would be useful for reference by the authorities of any place: it would be highly useful for inquirers who desire to compare place with place, and who find that to make the calculations themselves would require the devotion of their life to this one pursuit. Who has time and patience to calculate the marriage-rates in 21 pages of 50 or 60 lines in each? The same question may be asked as to the births: and as to the deaths, these occupy 100 pages of districts and sub-districts. I ask therefore, that the decennial volume should have the *rates* of births, marriages, and deaths, added to the *absolute numbers*.

I do not ask for an annual column of percentages: for as I have

* I am glad to hear that such a volume is being prepared.

shown in the case of Bradford,* no enumeration is to be relied on but the census; and the assumption of an uniform rate of increase will often prove untrue.

It is especially to be desired that the decennial volume should give the rates for boroughs: not, as in the annual returns, setting down a parish for a borough in one case, and a district for a borough in another.

These rates too should be given in each decennial volume, for 1841-50, for 1851-60, and hereafter for 1861-70: and this for counties, boroughs, and other divisions. An estimate of progress or retrogression would then be easy.

The decennial columns of population should distinguish males and females. At present we have the male deaths and the female deaths; but we can get the male population and the female population only by going to the census.

Then we want a summary for the 10 years of the deaths at different ages. At present, to ascertain the decennial deaths of young children for any county or town, we have to refer to ten reports, extract the figures and add them together. The summary should be accompanied with a percentage column, calculated in either of the two modes I have pointed out. If the census mode is adopted, the calculation should be made from all exposed to the risk of death, and not from those remaining alive. If the birth mode is adopted, the needful corrections should be made, and the principle of the correction should be stated. To me it would be more satisfactory if there were two columns, one for each mode. In this case, the number of births, and the population at each age and for two censuses, should be stated.

The sub-districts should be treated in the same way. Since places like Leamington and Chester are ranked as sub-districts, these minor divisions ought, once in 10 years, to have an opportunity of knowing their condition: and indeed every town or parish however small, is entitled to the same information.

The life tables at present, are for ordinary persons almost inaccessible, with no note to mark the volume and page in which they are buried. The male table is in one place, the female in another. The decennial volume should contain a life table, of males and females, whether a new one or a repetition of the old one. Every annual report should state where the life table is to be found.

A summary of the 10 years' deaths in hospitals and other public

* The Bradford statement was suspected by a disinterested authority. Mr. Winder, Assistant Commissioner, said in 1859, that the Bradford population was estimated by the municipal authorities at 130,000; but that after looking at the calculations, if the authority had not been so high, he should have been inclined to suspect that the estimate was too liberal. (Education Commission 2, 179.)

institutions should be given. The sexes and ages should be distinguished. This should be done for the country generally, and not for London only.

These are the principal additions which have occurred to me as desirable in the decennial report. But many others might probably be found by consulting other students of the registers.

Instructions Wanted.

On first opening one of the reports, the reader is bewildered with the multitude of particulars: he wants a guide to point out his way. A stereotyped preface should be given to each volume, and especially to the decennial volume. The rules for calculation should have examples added.

The following is some of the instruction required. "England" means "England and Wales." The Registrar-General has adopted the districts of the Poor-Law Board, and therefore does not strictly observe the geographical boundaries of counties. For example, Berkshire takes from its neighbours, 30,000 persons. Border places therefore, will often be found in adjoining counties. The index does not contain sub-districts.

The register takes no notice of boroughs, because *the poor-law* has no concern with them: Liverpool and other great towns are represented by parishes of the same names: Bradford and similar towns are concealed in districts of the same names. An ingenious and patient accountant may extract approximate statistics of the boroughs, with the help of the census. An example may be found in the *Statistical Journal* of June, 1864, pp. 188, 189.

Sub-districts.—Some places of considerable importance are ranked as sub-districts, *e.g.*, Leamington is part of the district of Warwick: Chester is merged in Great Boughton, and appears partly as Chester Castle, partly as Chester Cathedral, two minor divisions which do *not* together agree in numbers with those of Chester.

Calculations of rates.—The death-rates in the register, at XX, xix, for example, are calculated by a comparison of deaths with persons left alive: *e.g.*:—if the whole deaths of a particular year are set down as 22, this means that 22 have died to every 1,000 persons left alive. But the number exposed to the risk of death was $1,000 + 22 = 1,022$; and the true death-rate was $\frac{22 \times 1,000}{1,022} = 21.53$.*

In juvenile deaths the irregularity is much greater: *e.g.*:—if 360 children die in the first five years, this means that 360 have died to every 1,000 left alive. But the number exposed to the risk of death was $1,000 + 360 = 1,360$; and the true death-rate was

* This, I believe, is strictly true, only on the supposition of a stationary condition of population and of uniform ages.

$\frac{360 \times 1,000}{1,360} = 265$. That is, out of 1,000 children born, the number who die in the first 5 years is 265, not 360. This ought to be explained in the Register.

The life tables are not given in each volume, nor in the decennial volume: nor is the female table given with the male. There is one life table at IV, 23: another of males at XII, 73, and one of females at XX, 177.

Calculations of percentages require experience and care. The returns of one or two years, and an estimated population for any particular place, may lead to grave errors, as will be seen in the case of Bradford, given in the "Social Science Transactions for 1862," introduction, lii. The returns for the 10 years between one census and another are the only safe data, as the average population for such periods is known. Summaries of the returns for the 10 years are partly furnished: other summaries must be obtained by consulting the separate volumes for each year. For 1851 to 1861 the summaries given will be found in Vol. XXIII, pp. 174—327:—viz., the summary of marriages at districts at p. 174; of births in districts at p. 196; of births in sub-districts at p. 240; of deaths in districts at p. 218; of deaths in sub-districts at p. 240. No summary is given of marriages in sub-districts. This can be obtained by consulting the volumes for each year: and the same is true of the deaths at different ages.

The population of each place for 1851 and 1861, according to the conventional boundaries assigned by the Poor-Law Board, will be found in the summary at XXIII, 174, &c.; the acreage at p. 2, &c.; the male and female population are not given separately, but will be found in the census.

In making calculations as to the London districts, the hospitals and other public institutions must be taken into account. They are irregularly distributed; the City, *e.g.*, having none. All the districts that have such institutions are marked H, W, &c., in the 10 years' summary, but not in the annual reports. Each annual report contains, at pp. 83, 84, the number of deaths in these institutions during the year: but no 10 years' summary is given. Outside of London, no such institutions are marked in the districts; the sub-districts however, have the workhouses marked, but no other institutions.

No extensive calculations of percentages are added to any of the late reports; but some important ones deduced from the early reports, will be found in Vol. IX.

Forms of Calculation.

To find the death-rate of any place.—Add together the population of 1851 and 1861 (not according to the census, but according to

Registrar-General, XXIII, 218, &c.): half the total is the average population. Find the 10 years' deaths (Registrar-General, XXIII, 218, &c., for districts, 240, &c., for sub-districts): multiply by 100 and divide by the average population.

Example.—Bedfordshire, p. 218.

$$\text{Average population, } \frac{129,805 + 140,479}{2} = 135,142$$

Number of deaths 28,170.

$$\text{Death-rate during the 10 years, } \frac{28,170 \times 100}{135,142} = 20.85.*$$

To find the male death-rate.—Refer to the Census I, 194, &c. for the population of 1851 and 1861: half the total of the two will be the average. The summary of male deaths in districts is given by Registrar-General, XXIII, 218: no summary in sub-districts is given, but it can be collected from the separate volumes. Multiply the 10 years' deaths by 100, and divide by the average population.

To find the juvenile death-rate of any place.—The number living at any age must be found in the census. In boroughs the numbers are given for the whole borough: and as the Registrar-General knows nothing of boroughs as such, any calculation for boroughs by this mode is impossible. For places which are not boroughs caution is necessary. To ascertain how many children die of 1,000 who are born, the calculation must be made by a comparison of all who die and all who have been exposed to the risk of death.

E.g.: if the census gives 1,000 as the number of children under 5 living in a certain place; and if the annual deaths under 5 have been 350, the number who have been exposed to the risk of death is 1,000 + 350 = 1,350. The death-rate will be $\frac{350 \times 1,000}{1,350} = 259$.

Another mode is to compare the births with the deaths; making an allowance of 5 per cent. for excess of unregistered births over unregistered deaths. The deaths will be found in each report, p. 98, &c.: the births for the 10 years are summarised in XXIII, 196, &c., and 240, &c.

Example.—If a place has annually 1,350 registered births, and 350 registered deaths annually under 5 years, the death-rate will be $\frac{350 \times 1,000}{1,350} = 259$, subject to a deduction of 5 per cent. for excess of unregistered births over unregistered deaths.

These are the instructions which have occurred to me as examples. Others should be added as to marriages and births. By consulting different inquirers the list might be made complete.

* My Table A gives 20.78 and is taken from Registrar-General, XXIII, I explained before that the Registrar's averages are slightly altered by taking intercalated years into his account.

I have now finished the task I have undertaken, of first, explaining my three tables, column by column; and then briefly collecting my practical inferences under a few heads.

NOTE.—While was I revising the proof of this article, I became acquainted with a House of Commons Return, "Deaths," ordered 4th July, 1863. This paper has enabled me to test the accuracy of some of the figures in my appendix, as to which I have expressed fears that errors would be found among them. My column 7 of Table B, and my column 6 of Table C, contain a set of figures, which appear in the Parliamentary Return. I am glad to find that I am acquitted of any error of even slight importance.

The column, "At less than 1 year of age—All Causes,"—throws light on the most difficult question in my paper. The total infantile deaths, male and female, are set down as $\frac{177}{1000}$. This means that there were 177 deaths in proportion 1,000 infants *left alive*: I contend that it would be far more perspicuous to say that there were 177 deaths out of 1,177 infants exposed to the risk of death; and that therefore the true infantile death-rate was $\frac{150}{1000}$.

My infantile death-rate, at A, column 10, line 1, is 161; but this is for *boys* only: for boys and girls my rate would be 147, *i.e.*, 3 less than the 150 in the Parliamentary paper.

Considering that my calculation is made from births, while the other is made from the enumeration of two censuses, the difference of $\frac{3}{150}$, or 2 per cent., seems very small. This confirms me in my opinion that my proposed amendment, though not theoretically true, leads to a correct result in the present condition of the register.

APPENDIX.

TABLE A.—Vital Statistics of each County in England

1	2		3	4	5	6	7
Population, in Thousands, 1861, by the Census.	Population, in Thousands, 1861, by the Registrar-General.	Registration—Counties, &c.	Number of Acres to each Person.	Rural Population in Proportion to Town Population.	Increase of Population per Cent. in 10 Years by Census.	Number of Persons in a House.	Death-rate, 1841-50, to 1,000 of Population, Registrar-General, 13, 194.
20,066	20,066	England and Wales	1·86	—	11·93	5·37	22·28
112	2,804	London	·0279	—	18·70	7·8	24·55
135	140	Bedfordshire	2·18	2·10	9·	4·93	21·65
176	206	Berkshire	2·56	1·57	4·	4·93	20·11
168	147	Buckinghamshire	2·78	1·56	3·	4·81	21·43
176	182	Cambridgeshire.....	2·98	2·18	{ minus 5·	} 4·68	22·54
505	470	Cheshire.....	1·39	·76	11·	5·16	23·14
369	365	Cornwall	2·37	2·68	4·	5·06	18·97
205	205	Cumberland	4·87	1·30	5·	5·06	21·10
339	294	Derby.....	1·94	2·21	15·	4·90	21·22
584	589	Devonshire	2·83	1·11	3·	5·76	19·65
189	182	Dorsetshire	3·35	2·03	2·	5·01	19·51
509	542	Durham.....	1·22	1·07	30·	6·	22·4
405	380	Essex	2·62	3·48	10·	4·98	20·1
486	444	Gloucestershire.....	1·66	·83	6·	5·23	21·9
482	457	Hants.....	2·22	1·09	19·	5·57	20·
124	108	Herefordshire	4·32	3·38	7·	4·89	20·
173	177	Herts	2·25	2·89	4·	4·97	20·
64	59	Huntingdonshire	3·57	3·34	·1	4·69	21·
—	545	Kent (<i>extra metropolitan</i>)	1·4	·78	19·	5·81	20·
2,429	2,465	Lancashire.....	·5	·44	20·	5·54	27·
237	244	Leicestershire	2·16	1·37	3·	4·58	21·
412	404	Lincolnshire	4·31	2·23	1·	4·76	19·
—	187	{ Middlesex (<i>extra metro-</i> <i>politan</i>)	·08	·19	17·	7·90	19·
175	197	Monmouth.....	2·11	2·32	11·	5·28	21·
485	427	Norfolk	3·12	2·34	{ minus 2·	} 4·50	21·
228	231	Northamptonshire	2·77	2·38	7·	4·69	21·
343	343	Northumberland	3·64	·90	13·	6·17	22·
294	324	Nottinghamshire	1·79	·93	9·	4·70	22·
171	171	Oxon	2·77	1·79	·3	4·74	22·

APPENDIX.

and Wales in the Two Decades, 1841-50 and 1851-60.

8	9	10	11	12	13	14	15	16
Death-rate, 1851-60, Registrar- General, 23, xiv.	Male Death-rate, 1851-60, Registrar- General, 23, 218, and Census, 194.	Male Death-rate under 1 Year to 1,000 Births, Registrar- General, 14 to 23, and 23, 196.	Male Death-rate from 1 to under 5 Years. (Total of 4 Years.)	Male Death-rate from Birth to under 5 Years. (Total of 5 Years.)	Proportion of Male Death-rate under 1 to General Male Death-rate.	Number of Male Deaths in the 4 Years, over 1 and under 5, in Proportion to 100 Male Deaths under 1.	Rate of Farm Wages, 1860, <i>Statistical Journal</i> , xxiv, 328.	Number of Women per Cent. who sign Names to Marriage Registers, Registrar- General, xxiii, vi.
22·24	23·05	161	105	266	7·00	65	<i>s. d.</i> —	63·8
23·77	25·70	161	137	298	6·26	85	—	81·4
20·78	21·30	172	85	257	8·08	49	10 3	54·8
20·24	20·53	135	78	213	6·57	58	10 8	75·8
20·82	20·65	154	77	231	7·45	50	No return	65·0
20·55	21·33	172	86	258	8·06	50	10 —	65·5
22·49	23·28	170	101	271	7·30	60	11 8	54·9
20·44	21·43	139	89	228	6·49	64	10 6	56·9
20·84	21·45	139	87	226	6·48	63	15 —	66·4
21·71	21·69	156	88	244	7·19	56	12 —	64·5
19·77	20·74	130	95	225	6·27	73	9 2	72·6
19·35	19·71	132	79	211	6·69	60	9 4	71·0
23·30	23·29	164	111	275	7·04	68	14 3	57·8
20·18	20·44	145	84	229	7·09	58	11 3	69·1
21·11	22·13	149	94	243	6·73	64	9 5	73·2
20·26	21·01	130	93	223	6·19	71	12 —	76·1
20·28	20·67	137	67	204	6·63	49	9 —	71·1
18·93	19·43	139	73	212	7·15	52	10 —	66·6
19·69	20·56	164	74	238	7·98	54	10 9	67·9
20·11	20·75	141	88	229	6·79	62	12 —	75·9
26·30	27·44	192	144	336	6·99	75	12 7	45·9
21·86	22·43	175	93	268	7·80	53	13 6	66·3
19·47	19·75	159	70	229	8·05	44	13 —	72·3
20·67	21·76	141	92	233	6·48	65	No return	80·1
22·58	23·36	151	113	264	6·46	75	11 8	48·9
21·20	21·94	174	76	250	7·93	44	10 7	70·0
21·26	20·99	169	81	250	8·05	48	11 —	69·2
22·09	22·71	148	104	252	6·52	70	14 —	69·4
22·49	22·81	180	95	275	7·89	52	12 9	61·4
20·65	20·97	145	80	225	6·91	55	No return	71·7

TABLE A.—Vital Statistics of each County in Engla

1	2		3	4	5	6	7		
Population, in Thousands, 1861, by the Census.	Population, in Thousands, 1861, by the Registrar-General.	Registration—Counties, &c.	Number of Acres to each Person.	Rural Population in Proportion to Town Population.	Increase of Population per Cent. in 10 Years by Census.	Number of Persons in a House.	Death-rate 1841-50, to 1,000 of Population Registrar-General, 13, 194.		
22	23	Rutlandshire	4·36	3·26	{ minus 5·	} 4·71	19·34		
241	260	Salop	3·43	1·61	5·	4·98	20·86		
445	463	Somersetshire	2·35	2·62	·2	5·09	20·28		
747	770	Staffordshire	·97	·72	23·	5·08	23·86		
337	335	Suffolk	2·81	2·33	{ minus ·04	} 4·62	19·93		
—	273	{ Surrey (<i>extra metropo-</i> <i>litan</i>)	·58	·48	22·	6·38	18·07		
364	367	Sussex	2·58	·79	8·	5·55	18·29		
562	561	Warwickshire	1·	·43	18·	4·83	23·25		
61	61	Westmoreland	7·98	4·06	4·	5·16	19·31		
249	236	Wiltshire	3·47	1·09	{ minus 2·	} 4·70	20·69		
307	295	Worcestershire	1·54	·98	11·	4·87	20·95		
240	} 275 {	Yorkshire, East Riding	3·19	} ·91 {	9·	4·89	} 23·54		
40		„ City	·07		11·	4·90			
245		„ North Riding	5·5		2·10	14·		4·88	19·04
1,508		„ West „	1·13		·93	14·		4·65	23·02
427	416	North Wales	4·70	8·11	3·	4·69	19·54		
685	700	South „	4·	4·52	6·5	5·07	20·48		

Note.—Columns 3—6 a

TABLE B.—Vital Statistics of some of the Principal Cities and

1	2		3	4	5	6
Population, in Thousands, 1861, Municipal, by the Census, I, xxi.	Population, in Thousands, 1861, by the Registrar-General, 23, 222, &c.	Districts, Towns, &c.	Number of Acres to 100 Persons according to Registrar-General, 23, 6, &c.	Increase of Population per Cent. in 10 Years, Registrar-General, 23, 196.	Number of Persons in a House by the Census.	Death-rate, Male and Female, 1841-50, to 1,000 of Population, Registrar-General, 13, 194.
20,066	20,066	England and Wales	186	11·93	5·37	22·28
112	2,804	London	2·79	18·7	7·80	24·55
53	68	Bath	44·37	{ minus 2·16 }	6·55	24·02
—	213	Birmingham parish	1·25	22·23	5·01	26·16
296	—	„ borough	—	—	—	—
13	16	Edgbaston	—	—	—	—
—	—	„ parish	—	—	—	—

and Wales in the Two Decades, 1841-50 and 1851-60—Contd.

8	9	10	11	12	13	14	15	16
Death-rate, 1851-60, Registrar-General, 23, xiv.	Male Death-rate 1851-60, Registrar-General, 23, 218, and Census, 194.	Male Death-rate under 1 Year to 1,000 Births, Registrar-General, 14 to 23, and 23, 196.	Male Death-rate from 1 to under 5 Years (Total of 4 Years.)	Male Death-rate from Birth to under 5 Years. (Total of 5 Years.)	Proportion of Male Death-rate under 1 to General Male Death-rate.	Number of Male Deaths in the 4 Years, over 1 and under 5, in Proportion to 100 Male Deaths under 1.	Rate of Farm Wages, 1860, <i>Statistical Journal</i> , xxiv, 328.	Number of Women per Cent. who sign Names to Marriage Registers, Registrar-General, xxiii, vi.
18·	17·87	126	56	182	7·05	44	<i>s. d.</i> No return	78·8
20·10	20·49	142	77	219	6·93	54	10 —	59·9
19·78	20·52	135	77	212	6·58	57	10 —	69·4
24·85	25·31	182	126	308	7·19	69	12 6	48·3
20·23	20·43	147	69	216	7·19	47	10 7	69·7
18·02	18·19	126	84	210	6·93	67	12 9	82·0
18·95	19·69	130	79	209	6·60	61	11 8	81·6
23·28	24·06	176	113	289	7·31	64	10 9	64·0
18·31	18·55	104	64	168	5·61	61	14 3	77·7
20·66	20·79	135	80	215	6·49	60	9 6	69·8
20·36	21·02	157	88	245	7·47	56	10 —	63·6
22·18	23·04	181	91	272	7·86	50	13 6	71·1
19·47	19·56	136	66	202	6·95	49	13 6	74·3
23·89	24·55	177	111	287	7·21	63	13 6	53·4
20·18	20·44	131	80	211	6·41	61	} 11 2 {	46·1
21·69	22·48	137	103	240	6·09	75		42·1

taken from the Census.

Towns of England in the Two Decades, 1841-50 and 1851-60.

7	8	9	10	11	12	13	14
Death-rate, Male and Female, 1851-60, to 1,000 of Population, Registrar-General, 23, 220.	Male Death-rate, 1851-60, to 1,000 of Population, Registrar-General, 23, 218, and Census, 194.	Excess of Females over Males per Cent., 1861, Census, 192.	Male Death-rate under 1 Year to 1,000 Births, Registrar-General, xiv to xxiii, and xxiii, 196.	Male Death-rate over 1 and under 5 Years (Total of Four Years).	Male Death-rate from Birth to under 5 Years. (Five Years.)	Proportion of Male Death-rate under 1 to General Male Death-rate.	Number of Male Deaths in the 4 Years over 1 and under 5, in Proportion to 100 Male Deaths under 1.
22·24	23·05	5·25	161	105	266	7·00	65
23·77	25·70	14·48	161	137	298	6·26	85
22·03	24·78	53·30	161	95	255	6·50	59
26·51	28·05	4·65	189	140	329	6·74	74
25·20	26·41	5·61	—	—	—	—	—
14·90	17·33	44·5	—	—	—	—	—
—	—	57·20	—	—	—	—	—

TABLE B.—Vital Statistics of some of the Principal Cities and

1	2		3	4	5	6
Population, in Thousands, 1861, Municipal, by the Census, I, xxi.	Population, in Thousands, 1861, by the Registrar-General, 23, 222, &c.	Districts, Towns, &c.	Number of Acres to 100 Persons, according to Registrar-General, 23, 6, &c.	Increase of Population per Cent. in 10 Years, Registrar-General, 23, 196.	Number of Persons in a House by the Census.	Death-rate, Male and Female, 1841-50, to 1,000 of Population, Registrar-General, 13, 194.
63	120	Blackburn district	36·32	32·18	5·58	25·18
70	130	Bolton „	33·69	13·56	5·36	26·79
106	196	Bradford „	20·53	7·97	4·72	24·88
78	78	Brighton	2·99	18·49	6·24	21·36
—	66	Bristol parish	2·79	·47	6·53	28·60
154	—	„ borough	—	—	—	—
—	95	Clifton	—	—	—	—
40	50	Cheltenham district.....	49·96	12·61	5·66	20·12
31	59	Chester „	183·85	10·49	5·21	23·49
41	42	Coventry	13·18	13·14	4·55	26·85
43	51	Derby	5·82	16·86	4·80	23·98
34	59	Gateshead.....	43·07	23·56	7·65	24·53
98	57	Hull	3·21	12·26	5·00	30·63
18	19	Leamington	15·45	11·81	5·51	19·19
207	118	Leeds.....	1·79	16·11	4·64	29·56
68	68	Leicester	5·81	12·44	4·66	26·75
444	270	Liverpool parish*	·82	4·07	7·28	39·22
—	—	„ and West Derby	—	—	6·75	34·95
36	62	Macclesfield	132·54	{ minus } 2·82	4·33	25·96
339	244	Manchester	5·18	6·81	5·69	33·08
—	—	„ and Chorlton ..	—	—	5·51	30·69
102	105	Salford	4·58	20·35	5·36	27·65
109	111	Newcastle-on-Tyne	6·40	24·46	7·80	26·83
75	74	Norwich	5·81	9·16	4·38	23·90
75	76	Nottingham	2·47	29·69	4·84	25·51
72	111	Oldham.....	15·16	28·22	5·24	25·80
63	63	Plymouth	2·61	19·87	10·29	24·82
95	95	Portsmouth	8·23	31·47	6·00	24·72
83	111	Preston	61·56	14·48	5·51	25·12
185	128	Sheffield	8·21	24·44	4·87	26·65
47	43	Southampton	6·06	27·32	6·00	22·82
55	94	Stockport	32·55	4·6	4·86	25·28
78	91	Sunderland	13·17	28·52	7·80	24·33
61	127	Wolverhampton	42·47	21·83	5·17	27·24
35	30	Yarmouth.....	4·98	12·87	4·47	23·33
40	60	York	139·14	10·39	4·91	23·62

* Liverpool parish extends over part of the Mersey. Its whole area is 2,200 acres, ·82 should be

Towns of England in the Two Decades, 1841-50 and 1851-60—Contd.

7	8	9	10	11	12	13	14
Death-rate, Male and Female, 1851-60, to 1,000 of Population, Registrar-General, 23, 220.	Male Death-rate, 1851-60, to 1,000 of Population, Registrar-General, 23, 218, and Census, 194.	Excess of Females over Males per Cent., 1861, Census, 192.	Male Death-rate under 1 Year to 1,000 Births, Registrar-General, xiv to xxiii, and xxiii, 196.	Male Death-rate over 1 and under 5 Years. (Total of Four Years.)	Male Death-rate from Birth to under 5 Years. (Five Years.)	Proportion of Male Death-rate under 1 to General Male Death-rate.	Number of Male Deaths in the 4 Years over 1 and under 5, in proportion to 100 Male Deaths under 1.
26.34	27.30	6.99	205	136	341	7.51	67
26.88	28.60	7.42	194	133	327	6.78	68
25.69	26.89	15.59	205	126	331	7.63	61
22.00	24.99	34.23	174	111	285	6.96	64
26.71	29.68	16.00	177	136	313	5.96	76
—	—	23.18	—	—	—	—	—
17.50	21.15	73.50	—	—	—	—	—
19.00	20.78	38.20	156	83	239	7.51	53
22.21	23.27	4.63	156	98	254	6.70	63
25.27	26.73	11.52	224	113	337	8.38	50
24.08	25.33	11.60	172	111	283	6.79	65
25.82	26.23	{ minus 2.50 }	} 174	128	302	6.63	74
24.69	26.06	6.35	201	131	332	7.71	65
19.00	22.10	43.20	—	—	—	—	—
27.72	29.43	6.89	206	146	352	7.00	71
25.41	27.19	14.20	212	122	334	7.79	58
33.29	35.23	3.05	240	227	467	6.81	95
—	—	5.80	—	—	—	—	—
24.83	25.43	10.58	191	102	293	7.51	54
31.48	33.65	10.96	220	168	388	6.54	76
28.60	—	11.53	205	156	361	—	76
26.00	27.66	12.42	198	145	343	7.16	73
27.37	28.61	1.66	193	145	338	6.75	75
24.91	26.70	20.71	208	107	315	7.79	51
26.66	28.95	21.89	223	130	353	7.70	58
25.37	26.43	3.72	206	128	334	7.79	62
23.62	25.36	15.78	175	152	327	6.90	87
22.78	23.39	3.77	147	129	276	6.28	87
27.17	28.73	12.26	212	139	351	7.38	66
28.45	29.51	.97	196	151	347	6.64	77
24.45	27.49	12.50	171	119	290	6.22	70
25.62	26.87	13.99	204	114	318	7.59	56
24.89	25.98	5.46	170	132	302	6.54	78
27.61	28.45	{ minus 2.93 }	} 203	153	356	7.14	75
24.73	27.03	25.39	202	113	315	7.47	56
24.01	25.15	8.05	178	101	280	7.08	57

of which 1,560 acres are land, and 660 acres are water (Census 1861, I, 595). Therefore reduced to .58.

TABLE C.—Vital Statistics of the Metropolis, and of its Principal

1	2	3	4	5	
Population, in Thousands, 1861, Registrar-General, 23, 6.	London and some of its Districts.	Acres to each 100 Persons, Registrar-General, 23, 6.	Increase per Cent. in 10 Years, Census, 1, 196.	Number in a House, Census, 1, 196.	Death-rate, Male and Female, 1841-50, Including Hospitals, &c. Registrar-General, XIII, 198.
20,066	England and Wales.....	186	11·93	5·37	22·28
2,804	London	2·79	18·70	7·80	24·55
66	Lewisham (W. W.)	26·04	88·77	6·77	16·51
19	Hampstead (W.)	11·79	59·40	7·20	17·27
88	St. George's, Hanover Square (H.)	1·32	19·86	8·41	23·61
35	St. James, Westminster (W.)	·46	{ minus 2·97 }	10·60	20·55
162	Marylebone (H. H.).....	·93	2·53	9·88	23·89
23	{ St. Martin-in-the-Fields (H. and W.)	1·34	{ minus 7·92 }	10·13	25·77
43	Strand (H.)	·40	{ minus 3·24 }	11·39	23·27
129	Shoreditch (W. W.).....	·50	18·40	7·58	26·65
58	Bermondsey	1·18	21·25	7·10	26·79
49	St. George's-in-the-East (W.) ...	·50	1·07	7·92	27·70
79	Whitechapel (H. H.)	·51	{ minus ·99 }	9·11	31·20
56	{ St. George's, Southwark (W.) and L. A.).....	·51	7·11	7·67	28·07
54	St. Giles's (H.)	·45	{ minus ·25 }	11·53	25·18
27	West London (H.)	·51	{ minus 3·78 }	10·52	44·03
46	City	·95	{ minus 18·55 }	7·16	18·95
—	{ Bethnal Green (H., W., and L. A.).....	·72	16·53	7·13	24·19

Note.—(W.) means that there is a workhouse in this district;

Registration Districts in the Two Decades, 1841-50 and 1851-60.

6	7	8	9	10	11	12	13
Death-rate, Male and Female, 1851-60, Including Hospitals, &c. Registrar-General, xxiii, 220.	Death-rate, Male and Female, 1851-60, Excluding Hospitals, &c. Registrar-General, xxiii, 220, and 83-4.	Death-rate, Male and Female, 1851-60, adding One-sixth to Column 7 for Deaths in Public Institutions.	Male Death-rate, including Hospitals, 1851-60, Registrar-General, xxiii, 222, and Census, I, 196.	Excess of Females over Males, 1861, per Cent., Census, I, 196.	Male Death-rate, 1851-60, under 1 to 1,000 Births, Registrar-General, xiv to xxiii, 102, and xxiii, 196.	Male Death-rate over 1 and under 5 Years. (Total of Four Years.)	Male Death-rate from Birth to under 5 Years.
22·24	—	—	23·05	5·25	161	105	266
23·77	—	—	25·70	14·48	161	137	298
16·75	16·01	18·67	17·97	9·96	135	104	239
16·00	14·78	17·24	19·15	60·58	134	116	250
20·85	16·15	18·84	25·25	33·50	147	122	269
21·49	18·28	21·33	22·23	12·10	166	147	313
23·71	19·37	22·60	26·22	30·00	176	136	302
25·97	18·60	21·70	27·95	7·15	170	157	327
23·67	20·09	23·44	25·87	7·05	164	170	334
24·23	20·69	24·14	25·26	8·66	157	134	291
24·84	24·84	28·98	25·32	3·39	161	159	320
27·10	23·57	27·50	27·84	6·78	174	159	333
30·41	22·68	26·46	32·41	{ minus } 1·82	191	175	366
25·83	22·46	26·20	26·61	5·46	188	153	341
26·68	21·43	25·00	28·75	12·47	187	163	350
44·98	20·87	24·35	51·38	2·47	188	248	436
17·67	17·67	20·62	19·10	10·34	140	144	284
22·26	19·63	22·90	22·98	3·51	156	139	295

(H.) that there is a hospital; (L. A.) that there is a lunatic asylum.

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